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Patent and Trademark Office

1180 1

SEARCH REQUEST FORM

85150

Examiner # (Mandatory): 71618 Requester's Full Name: FRANCISCO C PRATS

Art Unit 1651 Location (Bldg/Room#): CM-11A07 Phone (circle 305 306 308) 3665

Serial Number: 09/921,188 Results Format Preferred (circle): PAPER DISK E-MAIL

Title of Invention PROCESS FOR THE PREPARATION OF CHIRAL ISOFLUORENES

Inventors (please provide full names): JOHN F. CHIARELLO, BRIAN LEE BUCKWALTER, TIMOTHY CLAUDE BARDE

Earliest Priority Date: 8-3-2000

Keywords (include any known synonyms registry numbers, explanation of initialisms):

- "1,4-DIARYL-2-FLUORO-2-BUTENES" (APPEAR TO BE KNOWN PRODUCTS, DISCLOSED IN U.S. 5,998,673)
- ESTERASE
- STRUCTURE - SEE CLAIM 6
- ELECTED CLAIMS ATTACHED (1-9) (CASE DUE BY END OF FEB)

Point of Contact:
Barb O'Bryen
Technical Information Specialist
STIC CM1 6A05 308-4291

Search Topic:

Please write detailed statement of the search topic, and the concept of the invention. Describe as specifically as possible the subject matter to be searched. Define any terms that may have a special meaning. Give examples of relevant citations, authors, etc., if known. You may include a copy of the abstract and the broadcast or most relevant claim(s).

- CASE TRANSFERRED TO ME BECAUSE ESTERASE INVOLVED IN THE SYNTHESIS OF 1,4-DIARYL-2-FLUORO-2 BUTENES
- PLEASE SEARCH ELECTED CLAIMS 1-9 AS FOLLOWS
  - CLAIMS 1-5 : SYNTHESIS OF 1,4-DIARYL-2-FLUORO-2 BUTENES W/ ESTERASE
  - CLAIM 6-9: COMPOUND (INTERMEDIATES IN SYNTH. OF CLAIMS 1-5 (STRUCTURE SEARCH OF CLAIM 6 IS SUFFICIENT)

THANK YOU!
FCPrats

STAFF USE ONLY

Searcher: FCPrats
Searcher Phone #:
Searcher Location:
Date Picked Up:
Date Completed: 1-28-03
Clerical Prep Time: 40
Terminal Time: 45
Number of Databases:

Type of Search

	N.A. Sequence
	A.A. Sequence
4	Structure (#)
	Bibliographic
	Litigation1
	Fulltext
	Procurement
	Other

Vendors (include cost where applicable)

662	STN
	Questel/Orbit
	Lexis/Nexis
	WWW/Internet
	In-house sequence systems (list)
	Dialog
	Dr. Link
	Westlaw
	Other (specify)

PTO-1590 (2-99)

=> fil reg; d stat que l14; fil capl; d que nos l16; fil uspatf; d que nos l21
FILE 'REGISTRY' ENTERED AT 11:50:04 ON 28 JAN 2003
USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.
PLEASE SEE "HELP USAGETERMS" FOR DETAILS.

Property values tagged with IC are from the ZIC/VINITI data file provided by InfoChem.

STRUCTURE FILE UPDATES: 27 JAN 2003 HIGHEST RN 482277-90-7
DICTIONARY FILE UPDATES: 27 JAN 2003 HIGHEST RN 482277-90-7

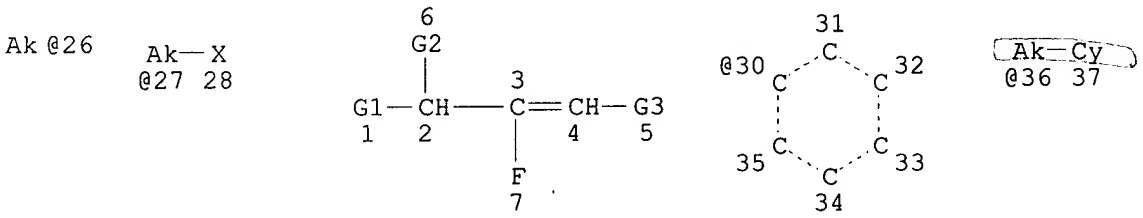
TSCA INFORMATION NOW CURRENT THROUGH MAY 20, 2002

Please note that search-term pricing does apply when conducting SmartSELECT searches.

Crossover limits have been increased. See HELP CROSSOVER for details.

Experimental and calculated property data are now available. See HELP PROPERTIES for more information. See STNote 27, Searching Properties in the CAS Registry File, for complete details:
http://www.cas.org/ONLINE/STN/STNOTES/stnotes27.pdf

L12 STR



VAR G1=30/HY
VAR G2=26/27/CB
VAR G3=30/HY/36
NODE ATTRIBUTES:
CONNECT IS E1 RC AT 26
DEFAULT MLEVEL IS ATOM
DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:
RING(S) ARE ISOLATED OR EMBEDDED
NUMBER OF NODES IS 18

STEREO ATTRIBUTES: NONE
L14 23 SEA FILE=REGISTRY SSS FUL L12

100.0% PROCESSED 27046 ITERATIONS 23 ANSWERS
SEARCH TIME: 00.00.02

Formula I from claim 1.
Note that G3 in this drawing = Ar, in claim. Ak=Cy is not supported by the claim, but does appear in the inventors' work, so I included this possibility.

FILE 'CAPLUS' ENTERED AT 11:50:04 ON 28 JAN 2003
USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.
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FILE COVERS 1907 - 28 Jan 2003 VOL 138 ISS 5
FILE LAST UPDATED: 27 Jan 2003 (20030127/ED)

This file contains CAS Registry Numbers for easy and accurate substance identification.

L12 STR
L14 23 SEA FILE=REGISTRY SSS FUL L12
L16 10 SEA FILE=CAPLUS ABB=ON L14 (P) preparation of these compounds

FILE 'USPATFULL' ENTERED AT 11:50:04 ON 28 JAN 2003
CA INDEXING COPYRIGHT (C) 2003 AMERICAN CHEMICAL SOCIETY (ACS)

FILE COVERS 1971 TO PATENT PUBLICATION DATE: 28 Jan 2003 (20030128/PD)
FILE LAST UPDATED: 28 Jan 2003 (20030128/ED)
HIGHEST GRANTED PATENT NUMBER: US6513163
HIGHEST APPLICATION PUBLICATION NUMBER: US2003019004
CA INDEXING IS CURRENT THROUGH 28 Jan 2003 (20030128/UPCA)
ISSUE CLASS FIELDS (/INCL) CURRENT THROUGH: 28 Jan 2003 (20030128/PD)
REVISED CLASS FIELDS (/NCL) LAST RELOADED: Dec 2002
USPTO MANUAL OF CLASSIFICATIONS THESAURUS ISSUE DATE: Dec 2002

>>> USPAT2 is now available. USPATFULL contains full text of the original, i.e., the earliest published granted patents or applications. USPAT2 contains full text of the latest US publications, starting in 2001, for the inventions covered in USPATFULL. A USPATFULL record contains not only the original published document but also a list of any subsequent publications. The publication number, patent kind code, and publication date for all the US publications for an invention are displayed in the PI (Patent Information) field of USPATFULL records and may be searched in standard search fields, e.g., /PN, /PK, etc. <<<

>>> USPATFULL and USPAT2 can be accessed and searched together through the new cluster USPATALL. Type FILE USPATALL to enter this cluster. <<<

>>> Use USPATALL when searching terms such as patent assignees, classifications, or claims, that may potentially change from the earliest to the latest publication. <<<

This file contains CAS Registry Numbers for easy and accurate substance identification.

L12 STR
L14 23 SEA FILE=REGISTRY SSS FUL L12
L21 7 SEA FILE=USPATFULL ABB=ON L14 (P) preparation

=> dup rem l16,l21
FILE 'CAPLUS' ENTERED AT 11:50:10 ON 28 JAN 2003
USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.
PLEASE SEE "HELP USAGETERMS" FOR DETAILS.
COPYRIGHT (C) 2003 AMERICAN CHEMICAL SOCIETY (ACS)

FILE 'USPATFULL' ENTERED AT 11:50:10 ON 28 JAN 2003
CA INDEXING COPYRIGHT (C) 2003 AMERICAN CHEMICAL SOCIETY (ACS)
PROCESSING COMPLETED FOR L16
PROCESSING COMPLETED FOR L21
L23 15 DUP REM L16 L21 (2 DUPLICATES REMOVED)
ANSWERS '1-10' FROM FILE CAPLUS
ANSWERS '11-15' FROM FILE USPATFULL

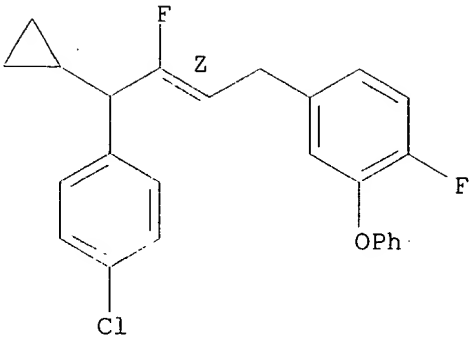
=> d ibib abs hitstr l23 1-15 fil cao; d que nos l22

L23 ANSWER 1 OF 15 CAPLUS COPYRIGHT 2003 ACS DUPLICATE 1
ACCESSION NUMBER: 2001:371701 CAPLUS
DOCUMENT NUMBER: 134:366675
TITLE: Preparation of phenoxyphenylfluorobutenes as parasiticides
INVENTOR(S): Watson, David Wesley; Heaney, Kathleen; Schwinghammer, Kurt
PATENT ASSIGNEE(S): American Cyanamid Company, USA
SOURCE: U.S., 25 pp.
CODEN: USXXAM
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 6235754	B1	20010522	US 1999-235932	19990122

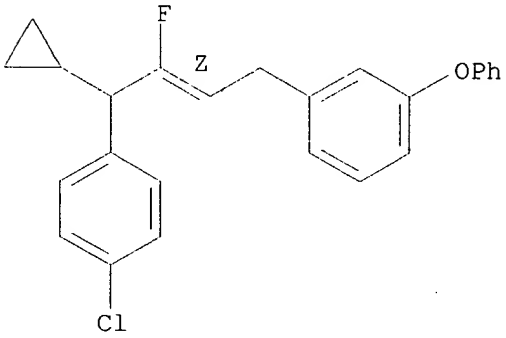
PRIORITY APPLN. INFO.: US 1998-73097P P 19980130
OTHER SOURCE(S): MARPAT 134:366675
AB R3CRR1CF:CR4CHR2R5 [I; R,R1 = H, (halo)(cyclo)alkyl; RR1 = alkylene; R2 = H, Cl, Br, cyano, OH, alkoxy; R3 = (un)substituted (hetero)aryl; R4 = H or F; R5 = (un)substituted (phenoxy)phenyl, -biphenylyl, -phenoxypyridinyl, etc.] were prepd. Thus, 4-ClC6H4CR:CFCHO (R = cyclopropyl) was condensed with 4,3-F(PhO)C6H3CH2P(Ph)3Br (prepn. each given) to give, after redn., (Z)-4-ClC6H4CHRCF:CHCH2C6H3(OPh)F-3,4 (R as above). Data for biol. activity of I were given.
IT **200401-86-1P 200401-93-0P 200401-94-1P**
200401-95-2P 200401-96-3P 200401-97-4P
200401-98-5P 200402-00-2P 200402-02-4P
200402-03-5P 233760-20-8P 233760-21-9P
340293-60-9P
RL: AGR (Agricultural use); BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); SPN (Synthetic preparation); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
(prepn. of phenoxyphenylfluorobutenes as parasiticides)
RN 200401-86-1 CAPLUS
CN Benzene, 4-[(2Z)-4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



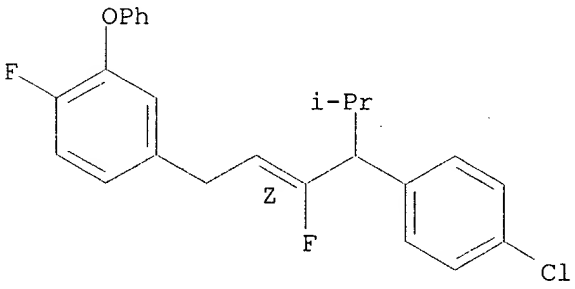
RN 200401-93-0 CAPLUS
CN Benzene, 1-[(2Z)-4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-3-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



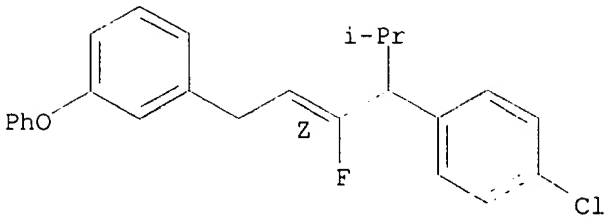
RN 200401-94-1 CAPLUS
CN Benzene, 4-[(2Z)-4-(4-chlorophenyl)-3-fluoro-5-methyl-2-hexenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



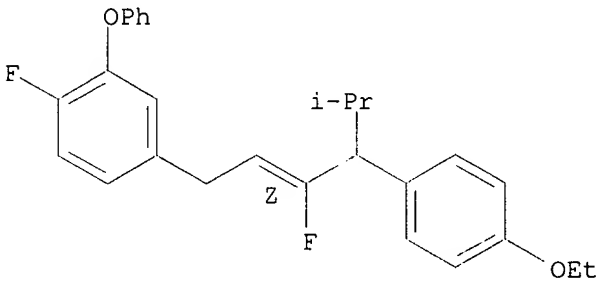
RN 200401-95-2 CAPLUS
CN Benzene, 1-[(2Z)-4-(4-chlorophenyl)-3-fluoro-5-methyl-2-hexenyl]-3-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



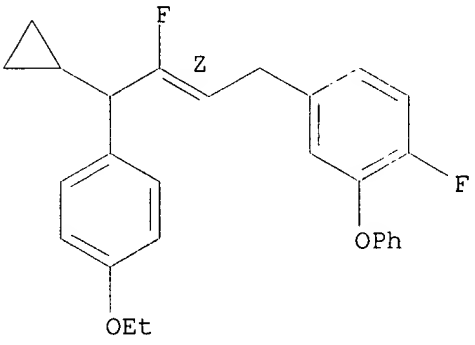
RN 200401-96-3 CAPLUS
CN Benzene, 4-[(2Z)-4-(4-ethoxyphenyl)-3-fluoro-5-methyl-2-hexenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



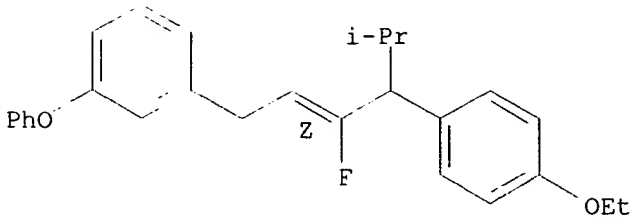
RN 200401-97-4 CAPLUS
CN Benzene, 4-[(2Z)-4-cyclopropyl-4-(4-ethoxyphenyl)-3-fluoro-2-butenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



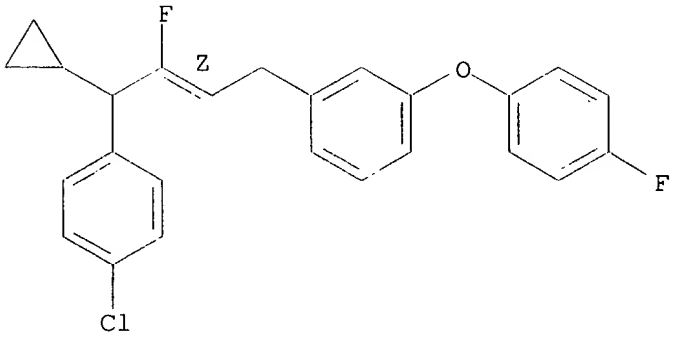
RN 200401-98-5 CAPLUS
CN Benzene, 1-[(2Z)-4-(4-ethoxyphenyl)-3-fluoro-5-methyl-2-hexenyl]-3-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



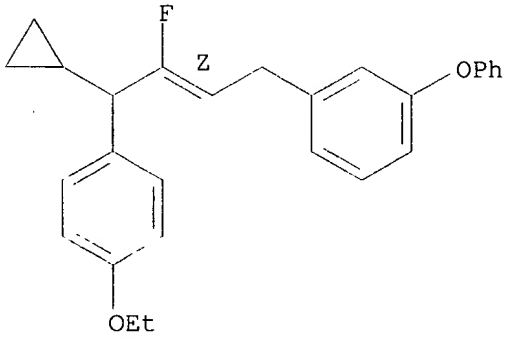
RN 200402-00-2 CAPLUS
CN Benzene, 1-[(2Z)-4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-3-(4-fluorophenoxy)- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



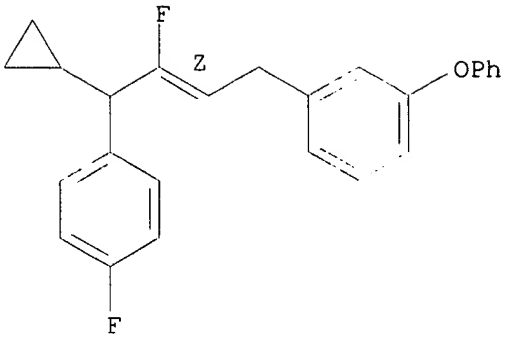
RN 200402-02-4 CAPLUS
CN Benzene, 1-[(2Z)-4-cyclopropyl-4-(4-ethoxyphenyl)-3-fluoro-2-butenyl]-3-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



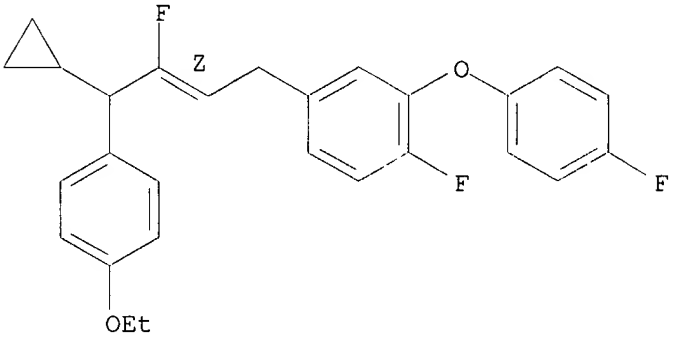
RN 200402-03-5 CAPLUS
CN Benzene, 1-[(2Z)-4-cyclopropyl-3-fluoro-4-(4-fluorophenyl)-2-butenyl]-3-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



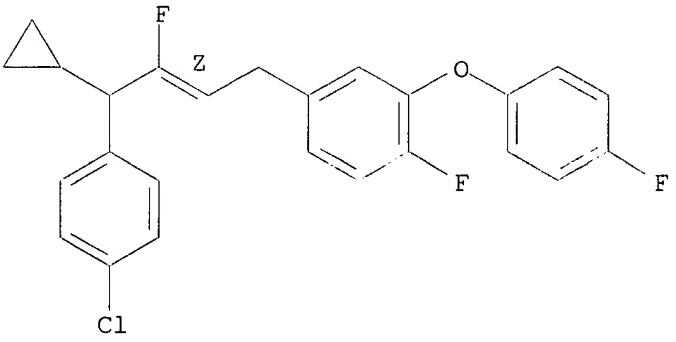
RN 233760-20-8 CAPLUS
CN Benzene, 4-[(2Z)-4-cyclopropyl-4-(4-ethoxyphenyl)-3-fluoro-2-butenyl]-1-fluoro-2-(4-fluorophenoxy)- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



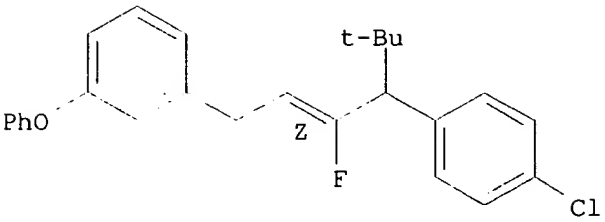
RN 233760-21-9 CAPLUS
CN Benzene, 4-[(2Z)-4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-(4-fluorophenoxy)- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



RN 340293-60-9 CAPLUS
CN Benzene, 1-[(2Z)-4-(4-chlorophenyl)-3-fluoro-5,5-dimethyl-2-hexenyl]-3-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.

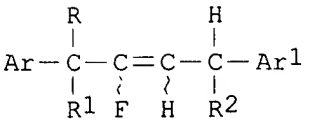


REFERENCE COUNT: 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L23 ANSWER 2 OF 15 CAPLUS COPYRIGHT 2003 ACS DUPLICATE 2
ACCESSION NUMBER: 1999:780362 CAPLUS
DOCUMENT NUMBER: 132:12197
TITLE: Preparation of 1,4-diaryl-2-fluoro-2-butene derivatives as insecticidal and acaricidal agents
INVENTOR(S): Barnes, Keith D.; Hu, Yulin
PATENT ASSIGNEE(S): American Cyanamid Company, USA
SOURCE: U.S., 17 pp.
CODEN: USXXAM
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 5998673	A	19991207	US 1997-865244	19970529

PRIORITY APPLN. INFO.: US 1996-19010P P 19960603
US 1997-40461P P 19970317
OTHER SOURCE(S): MARPAT 132:12197
GI



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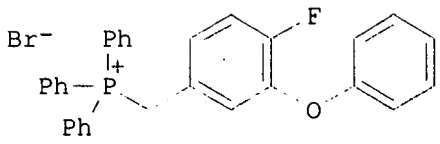

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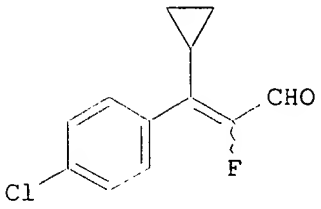
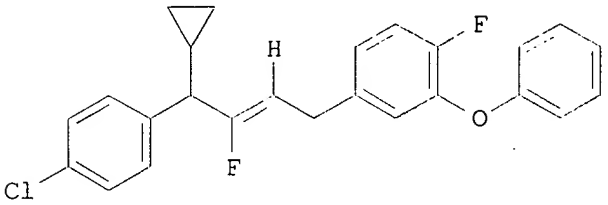


III



IV

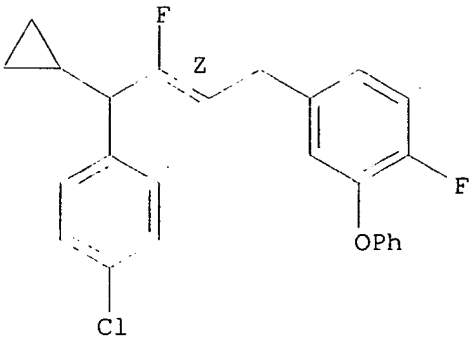
AB Pesticidal 1,4-diaryl-2-fluoro-2-butene compds. I are disclosed, as well as compns. and methods comprising them, for the control of insect and acarid pests [wherein: Ar = (un)substituted Ph, 1- or 2-naphthyl, or a 5- or 6-membered heteroarom. ring; R, R1 = H, alkyl, haloalkyl, cycloalkyl or halocycloalkyl; or R and R1 form a C3-6 cycloalkyl ring optionally substituted halo and/or alkyl; R2 = H, Cl, Br, cyano, or OR3; R3 = H or C1-4 alkyl; and Ar1 = (un)substituted Ph, biphenyl, pyridyl, 1- or 2-naphthyl, or heteroaryl]. Nineteen example compds. are given. For instance, phosphonium salt II underwent Wittig reaction with aldehyde III (prepns. given), followed by partial redn. of the resultant diene with Mg in MeOH/THF, to give title compd. IV (X = Cl). The analogous compd. IV (X = OEt) gave complete kill of Spodoptera eridania, Diabrotica virgifera, Heliothis virescens, Aphis fabae, and Tetranychus urticae, at 50-100 ppm.

IT **200401-86-1P 200401-93-0P 200401-94-1P**
200401-95-2P 200401-96-3P 200401-97-4P
200401-98-5P 200401-99-6P 200402-00-2P
200402-01-3P 200402-02-4P 200402-03-5P
RL: AGR (Agricultural use); BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); SPN (Synthetic preparation); BIOL (Biological study); PREP (Preparation); USES (Uses)
(prepn. of 1,4-diaryl-2-fluoro-2-butene insecticidal and acaricidal agents)

RN 200401-86-1 CAPLUS

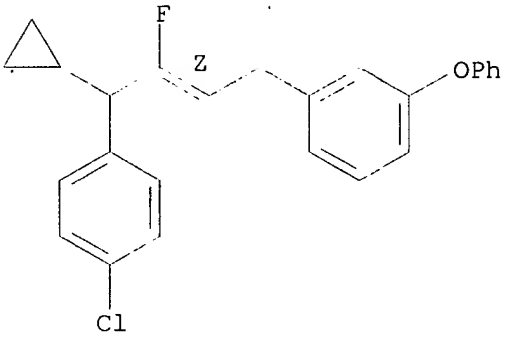
CN Benzene, 4-[(2Z)-4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



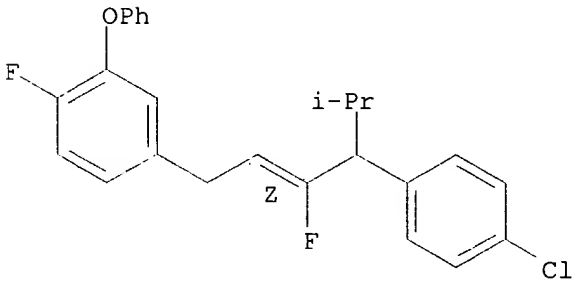
RN 200401-93-0 CAPLUS
CN Benzene, 1-[(2Z)-4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-3-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



RN 200401-94-1 CAPLUS
CN Benzene, 4-[(2Z)-4-(4-chlorophenyl)-3-fluoro-5-methyl-2-hexenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



RN 200401-95-2 CAPLUS
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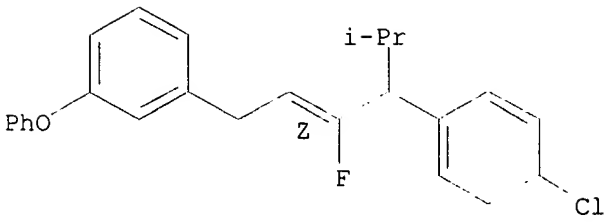
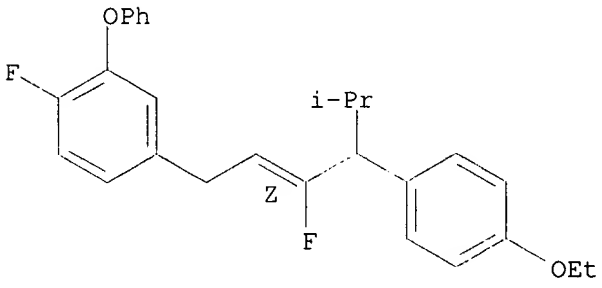
Double bond geometry as shown.



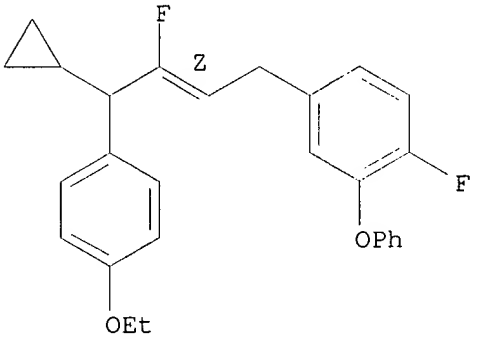
RN 200401-96-3 CAPLUS
CN Benzene, 4-[(2Z)-4-(4-ethoxyphenyl)-3-fluoro-5-methyl-2-hexenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



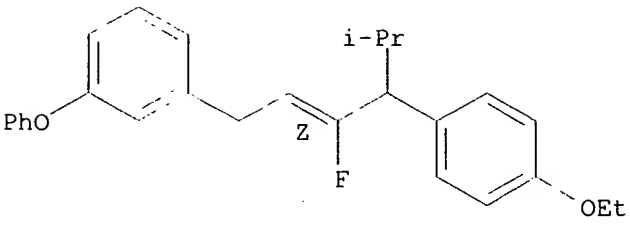
RN 200401-97-4 CAPLUS
CN Benzene, 4-[(2Z)-4-cyclopropyl-4-(4-ethoxyphenyl)-3-fluoro-2-butenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



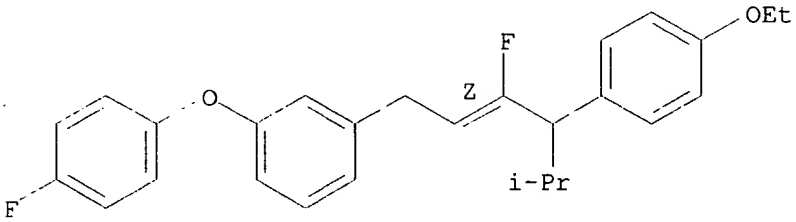
RN 200401-98-5 CAPLUS
CN Benzene, 1-[(2Z)-4-(4-ethoxyphenyl)-3-fluoro-5-methyl-2-hexenyl]-3-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



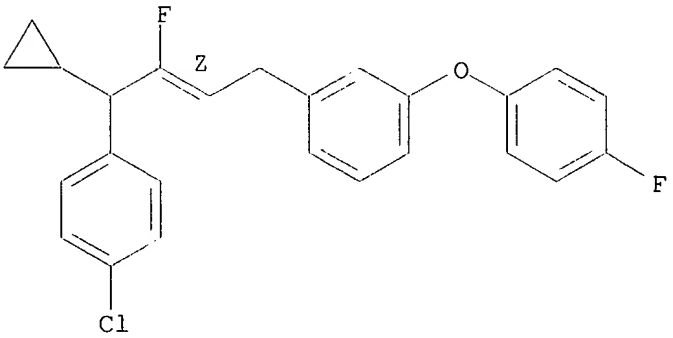
RN 200401-99-6 CAPLUS
CN Benzene, 1-[(2Z)-4-(4-ethoxyphenyl)-3-fluoro-5-methyl-2-hexenyl]-3-(4-fluorophenoxy)- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



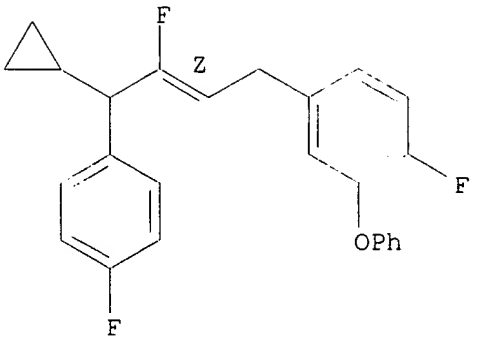
RN 200402-00-2 CAPLUS
CN Benzene, 1-[(2Z)-4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-3-(4-fluorophenoxy)- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



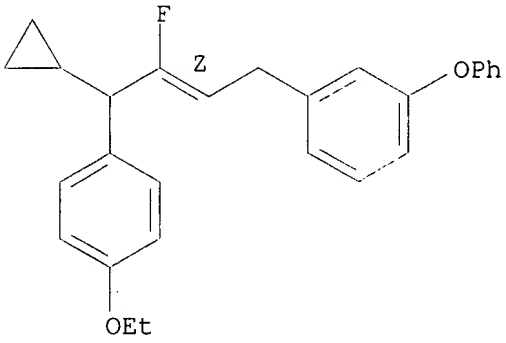
RN 200402-01-3 CAPLUS
CN Benzene, 4-[(2Z)-4-cyclopropyl-3-fluoro-4-(4-fluorophenyl)-2-butenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



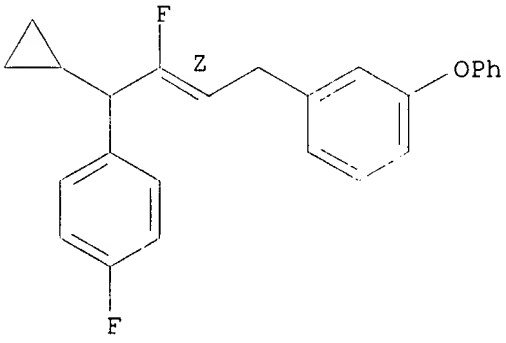
RN 200402-02-4 CAPLUS
CN Benzene, 1-[(2Z)-4-cyclopropyl-4-(4-ethoxyphenyl)-3-fluoro-2-butenyl]-3-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



RN 200402-03-5 CAPLUS
CN Benzene, 1-[(2Z)-4-cyclopropyl-3-fluoro-4-(4-fluorophenyl)-2-butenyl]-3-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



REFERENCE COUNT: 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L23 ANSWER 3 OF 15 CAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 2002:122926 CAPLUS
DOCUMENT NUMBER: 136:183615
TITLE: Process for the preparation of chiral insecticidal and acaricidal 1,4-diaryl-2-fluoro-2-butenes via enzymic

Searched by Barb O'Bryen, STIC 308-4291

hydrolysis of (4-chlorophenyl)cyclopropylethanoic acid methyl ester using esterase

INVENTOR(S): Chiarello, John Francis; Buckwalter, Brian Lee; Barden, Timothy Claude

PATENT ASSIGNEE(S): Basf Aktiengesellschaft, Germany

SOURCE: PCT Int. Appl., 75 pp.
CODEN: PIXXD2

DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002012155	A2	20020214	WO 2001-EP9012	20010803
WO 2002012155	A3	20021128		
W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM			
RW:	GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG			
US 2002032351	A1	20020314	US 2001-921188	20010802
AU 2001082067	A5	20020218	AU 2001-82067	20010803

PRIORITY APPLN. INFO.: US 2000-222733P P 20000803
WO 2001-EP9012 W 20010803

OTHER SOURCE(S): CASREACT 136:183615; MARPAT 136:183615

AB There is provided a process for the prepn. of a chiral compd. of formula ArC*H(R)CF:CHAr1 [I; Ar, Ar1 = (un)substituted aryl or a 5- or 6-membered heteroarom. ring; R is C1-4 alkyl, C1-4 haloalkyl, C3-6 cycloalkyl or C3-6 halocycloalkyl; Ar1 , is aryl or a 5- or 6-membered heteroarom. ring; C* represents an asym. center] which is useful as an insecticidal and acaricidal agent and for protecting plants from damage caused by insect and acarid attack and infestation (no data). Also provided are intermediate compds. useful in the process of the present invention. This process comprises (a) treating a racemic ester of formula ArCH(R)CO2R4 (II; Ar, R = same as above; R4 = C1-4 alkyl) with an esterase to form a first mixt. of either R-acid of formula ArCH(R)CO2H (III) and S-ester of formula II or of S-acid of formula III and R-ester of formula II, (b) sepg. (R)- or (S)-acid III from said (S)- or (R)-ester II, (c) reducing the chiral acid (R)- or (S)-acid III or (S)- or (R)-ester II to obtain a chiral alc. of formula (R)- or (S)-ArC*H(R)CH2OH, (d) transforming the chiral alc. into an ester (R)- or (S)-ArC*H(R)CH2CO2R1, (e) fluorinating the latter ester to afford a fluoro-ester (R)- or (S)-ArC*H(R)CHFCO2R1, and (f) reacting the latter fluoro-ester with an aldehyde Ar1CH2CHO (Ar1 = same as above) in a solvent in the presence of a base to afford a second mixt. of 4 chiral diastereomeric hydroxy-esters ArC*H(R)CHF(CO2R1)CH(OH)CH2Ar1. It further comprises (g) optionally sepg. the second mixt. into a third mixt. each having two chiral diastereomers, (h) treating the hydroxy-ester mixts. with an acylating agent R2COX1 (R2 = C1-4 alkyl; X1 = Cl, Br, R2CO2) to afford a fifth mixt. of 4 chiral diastereomeric acyloxy esters or a seventh mixt. of two chiral diastereomeric acyloxy esters ArC*H(R)CHF(CO2R1)CH(O2CR2)CH2Ar1, (i) optionally sepg. the sixth or seventh mixt. not essentially pure chiral diastereomeric acyloxy ester, (j) hydrolyzing the pure acyloxy esters or mixts. of esters to afford a hydroxy acid ArC*H(R)CHF(CO2H)CH(OH)CH2Ar1, and (k) heating the hydroxy acid with a arylsulfonyl halide to afford I. Thus, Me (2RS)-(4-chlorophenyl)(cyclopropyl)ethanoate was treated with horse liver esterase in water (pH 7.5) to give 37.9% (2R)-(4-chlorophenyl)(cyclopropyl)ethanoic acid and 36.2% Me (2S)-(4-

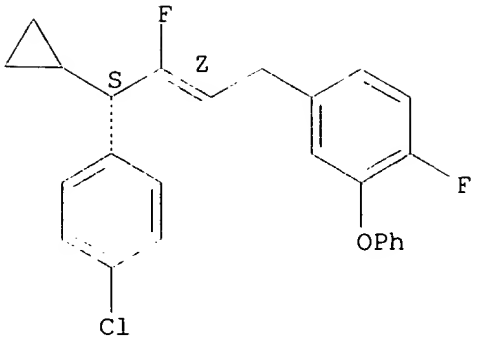
chlorophenyl)(cyclopropyl)ethanoate, each of which was reduced by BH3.THF/THF at room temp. for 4 h and DIBAL/CH2Cl2 warming from -78.degree. to room temp. and at room temp. for 1 h, resp., to give 84% (2R)-(4-chlorophenyl)(cyclopropyl)ethanol and 80% (2S)-(4-chlorophenyl)(cyclopropyl)ethanol, resp. Each of (2R)- and (2S)-(4-chlorophenyl)(cyclopropyl)ethanol was tosylated by tosyl chloride in the presence of Et3N in CH2Cl2 to (2R)- and (2S)-(4-chlorophenyl)(cyclopropyl)ethyl p-toluenesulfonate, resp., which underwent cyanation with NaCN in DMSO at 90.degree. for 3 h to give (2R)- and (2S)-3-(4-chlorophenyl)-3-cyclopropylpropanenitrile, resp. Alkali hydrolysis of (2R)- and (2S)-3-(4-chlorophenyl)-3-cyclopropylpropanenitrile in a mixt. of 10% aq. NaOH and methanol under reflux for 18 h followed by acidification with concd. HCl gave (2R)- and (2S)-3-(4-chlorophenyl)-3-cyclopropylpropanoic acid, resp., which was esterified with MeOH in the presence of HCl at room temp. for 18 h gave Me (2R)- and (2S)-3-(4-chlorophenyl)-3-cyclopropylpropanoate, resp. Lithiation of the each ester with lithium diisopropylamide (LDA) in THF at -78.degree. to 0.degree. followed by fluorination with (PhSO2)2NF at -78.degree. to room temp. and room temp. for 2 h gave Me (2R)- and (2S)-3-(4-chlorophenyl)-3-cyclopropyl-2-fluoropropanoate, resp. Lithiation of Me (2S)-3-(4-chlorophenyl)-3-cyclopropyl-2-fluoropropanoate with LDA in THF at -78.degree. for 15 min followed by addn. reaction with 4-fluoro-3-phenoxyphenylacetaldehyde at -78.degree. for 2 h gave, after silica gel chromatog., an oil (A) contg. (2R,3R) and (2R,3S) or (2S,3R)-Me 2-[(S)-(4-chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)-3-hydroxybutanoate and an oil contg. (2S,3S) and (2S,3R) or (2R,3S)-Me 2-[(S)-(4-chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)-3-hydroxybutanoate (steps f and g). Acetylation of the oil A with Ac2O in the presence of DAMP in CH2Cl2 at room temp. for 2 h gave Me (2R,3R)-3-(acetyloxy)-2-[(S)-(4-chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)butanoate and Me (2R,3S or 2S,3R)-3-(acetyloxy)-2-[(S)-(4-chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)butanoate (step h and i). Alkali hydrolysis of the latter diastereomer in a mixt. of 10% aq. NaOH, MeOH, and THF under reflux for 1 h gave (2S,3R or 2R,3S)-2-[(S)-(4-chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)-3-hydroxybutanoic acid (step j) which was heated with tosyl chloride in collidine at 170.degree. for 2 h to give 4-[(2Z,4S)-4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-phenoxybenzene as a colorless oil (step k).

IT **398453-72-0P**, 4-[(2Z,4S)-4-(4-Chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-phenoxybenzene **398453-73-1P**, 4-[(2E,4S)-4-(4-Chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-phenoxybenzene **398453-74-2P**, 4-[(2E,4R)-4-(4-Chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-phenoxybenzene **398453-75-3P**, 4-[(2Z,4R)-4-(4-Chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-phenoxybenzene
RL: AGR (Agricultural use); SPN (Synthetic preparation); BIOL (Biological study); PREP (Preparation); USES (Uses)
(process for prepn. of chiral insecticidal and acaricidal diarylfluorobutenes via enzymic hydrolysis of (4-chlorophenyl)cyclopropylethanoic acid Me ester using esterase)

RN 398453-72-0 CAPLUS

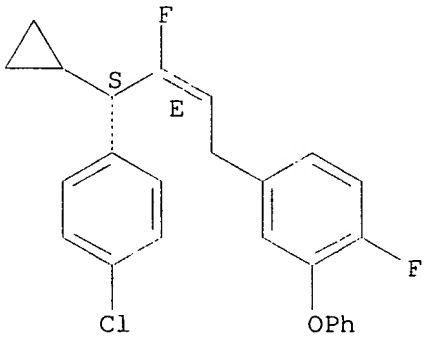
CN Benzene, 4-[(2Z,4S)-4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

Absolute stereochemistry.
Double bond geometry as shown.



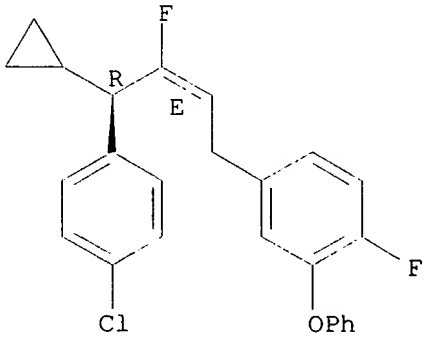
RN 398453-73-1 CAPLUS
CN Benzene, 4-[(2E,4S)-4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

Absolute stereochemistry.
Double bond geometry as shown.



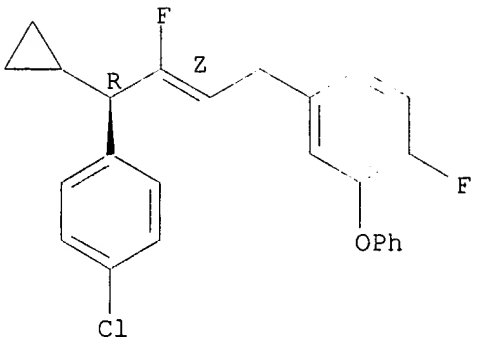
RN 398453-74-2 CAPLUS
CN Benzene, 4-[(2E,4R)-4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

Absolute stereochemistry.
Double bond geometry as shown.



RN 398453-75-3 CAPLUS
CN Benzene, 4-[(2Z,4R)-4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

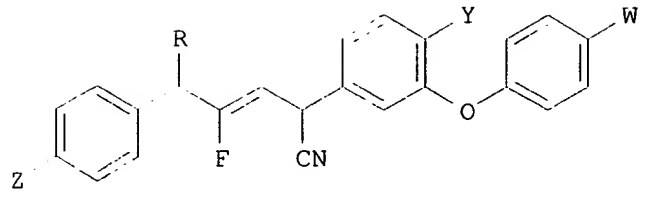
Absolute stereochemistry.
Double bond geometry as shown.



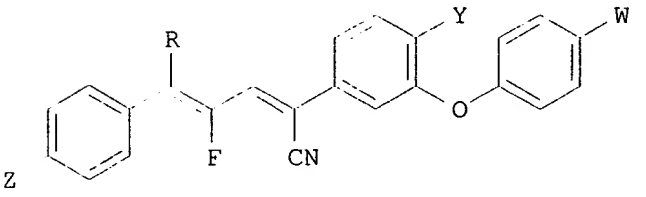
L23 ANSWER 4 OF 15 CAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 2001:816615 CAPLUS
DOCUMENT NUMBER: 135:344285
TITLE: 1,4-Diaryl-2-fluoro-4-cyano-2-butenes, process for their preparation and useful intermediates
INVENTOR(S): Hu, Yulin; Hunt, David Allen
PATENT ASSIGNEE(S): Basf Aktiengesellschaft, Germany
SOURCE: PCT Int. Appl., 18 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2001083428	A1	20011108	WO 2001-EP4958	20010503
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
US 2002019556	A1	20020214	US 2001-849298	20010504
US 6444838	B2	20020903		

PRIORITY APPLN. INFO.: US 2000-201826P P 20000504
OTHER SOURCE(S): CASREACT 135:344285; MARPAT 135:344285
GI



I



II

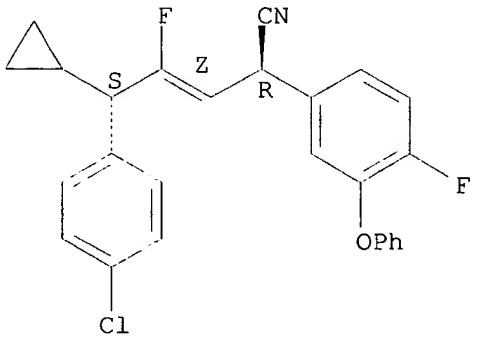
AB The prepn. and intermediates useful in the prepn. of 1,4-diaryl-2-fluoro-4-cyano-2-butene compds. [ArCH(R)CF=CHCH(CN)Ar'] are described. Particularly preferred are compds. of formula I and II (Z = Cl, F, OEt; R = c-C3H5, iPr; W and Y are independently H or F). Compds. II are converted into I in refluxing MeOH/THF with added magnesium under nitrogen.

IT **371759-00-1P**
RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP (Preparation)
(prepn. of)

RN 371759-00-1 CAPLUS

CN Benzeneacetonitrile, .alpha.-[(1Z,3R)-3-(4-chlorophenyl)-3-cyclopropyl-2-fluoro-1-propenyl]-4-fluoro-3-phenoxy-, (.alpha.S)-rel- (9CI) (CA INDEX NAME)

Relative stereochemistry.
Double bond geometry as shown.



REFERENCE COUNT: 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L23 ANSWER 5 OF 15 CAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 2001:137168 CAPLUS
DOCUMENT NUMBER: 134:178341
TITLE: Preparation of 2-arylvinyl alkyl ethers and 1,4-diaryl-2-fluoro-2-butenes.
INVENTOR(S): Hu, Yulin; Hunt, David Allen; Liu, Weiguo
PATENT ASSIGNEE(S): American Cyanamid Company, USA
SOURCE: PCT Int. Appl., 54 pp.
CODEN: PIXXD2

Searched by Barb O'Bryen, STIC 308-4291

DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2001012578	A1	20010222	WO 2000-US21464	20000807
W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
US 6291721	B1	20010918	US 1999-373262	19990812
BR 2000013100	A	20020430	BR 2000-13100	20000807
EP 1202948	A1	20020508	EP 2000-952575	20000807
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL				

PRIORITY APPLN. INFO.: US 1999-373262 A 19990812
WO 2000-US21464 W 20000807

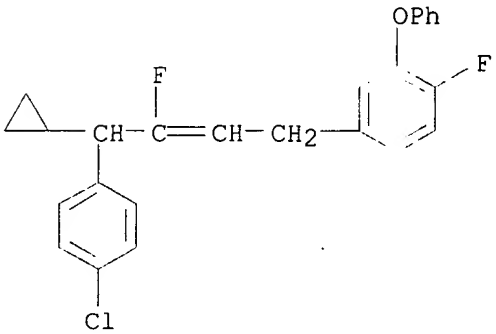
OTHER SOURCE(S): CASREACT 134:178341; MARPAT 134:178341

AB Ar(R)C:CHOR [R = H, alkyl, haloalkyl, cycloalkyl, halocycloalkyl; R1 = alkyl; Ar = (substituted) Ph, naphthyl, heteroaryl], were prepd. in the absence of phosphonium halides by reaction of ArCHRCHO (variables as above) with R1OH in the presence of acid, or reaction of ArCHRCH(OR1)2 in an aprotic solvent at elevated temp. in the presence of acid. Thus, 1-[1-(p-chlorophenyl)-2,2-dimethoxyethyl]cyclopropane (prepn. given) was refluxed with 4-MeC6H4SO3H in PhMe with distn. of PhMe/MeOH to give 96% 1-[1-(p-chlorophenyl)-2-methoxyvinyl]cyclopropane. This in H2O contg. KOH and 18-crown-6 at 7-10.degree. was treated with CHCl2F followed by stirring for 36 h at 10-13.degree., addn. of H2O, and heating at 70-75.degree. for 4 h to give (Z)- and (E)-p-chloro-.beta.-cyclopropyl-.alpha.-fluorocinnamaldehyde as a separable mixt. This was used to prep. (Z)-1-[1-(p-chlorophenyl)-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)-2-butenyl]cyclopropane.

IT **269398-40-5P**
RL: SPN (Synthetic preparation); PREP (Preparation)
(prepn. of 2-arylvinyl alkyl ethers and 1,4-diaryl-2-fluoro-2-butenes)

RN 269398-40-5 CAPLUS

CN Benzene, 4-[4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)



REFERENCE COUNT: 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L23 ANSWER 6 OF 15 CAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 2000:351483 CAPLUS
DOCUMENT NUMBER: 132:347408
TITLE: 1,4-Diaryl-2-fluoro-1-buten-3-ol compounds and their use in the preparation of 1,4-diaryl-2-fluoro-1,3-butadiene and 1,4-diaryl-2-fluoro-2-butene compounds
INVENTOR(S): Hu, Yulin; Hunt, David Allen
PATENT ASSIGNEE(S): American Cyanamid Company, USA
SOURCE: PCT Int. Appl., 44 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

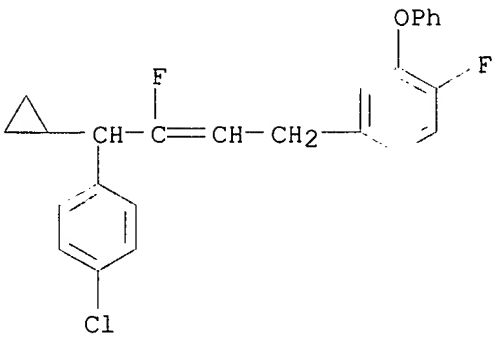
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2000029362	A1	20000525	WO 1999-US26434	19991109
W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
RW: GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
BR 9915368	A	20010814	BR 1999-15368	19991109
EP 1131273	A1	20010912	EP 1999-958849	19991109
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
JP 2002529524	T2	20020910	JP 2000-582353	19991109
US 6342642	B1	20020129	US 2001-856229	20010813

PRIORITY APPLN. INFO.: US 1998-192680 A 19981116
WO 1999-US26434 W 19991109
OTHER SOURCE(S): MARPAT 132:347408

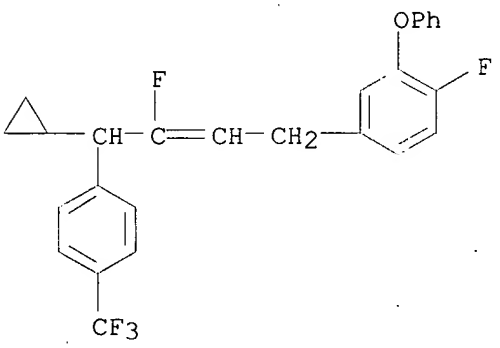
AB Prepn. of 1,4-diaryl-2-fluoro-1-buten-3-ol compds. ArCR:CFCH(OH)CH2Ar1 [R = H, alkyl, haloalkyl, cycloalkyl; Ar = (un)substituted Ph; Ar1 = (un)substituted Ph, phenoxyphenyl, biphenyl, etc.] and the use of these compds. in the prepn. of 1,4-diaryl-2-fluoro-1,3-butadiene compds. ArCR:CFCH:CHAr1 and 1,4-diaryl-2-fluoro-2-butene compds. ArCHRCF:CHCH2Ar1 are given. E.g., treating 1-(p-chlorophenyl)-1-cyclopropyl-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)-1-buten-3-ol (prepn. given) with NaH/p-toluenesulfonyl chloride gave 61% 1-(p-chlorophenyl)-1-cyclopropyl-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)-1,3-butadiene.

IT **269398-40-5P 269398-41-6P**
RL: SPN (Synthetic preparation); PREP (Preparation)
(prepn. of diarylfluorobutenol compds. and their use in the prepn. of butadiene and butene derivs.)

RN 269398-40-5 CAPLUS
CN Benzene, 4-[4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)



RN 269398-41-6 CAPLUS
CN Benzene, 4-[4-cyclopropyl-3-fluoro-4-[4-(trifluoromethyl)phenyl]-2-butenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)



REFERENCE COUNT: 3 THERE ARE 3 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L23 ANSWER 7 OF 15 CAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 1999:505746 CAPLUS
DOCUMENT NUMBER: 131:126722
TITLE: Preparation of diarylfluorobutene derivatives as ectoparasiticides and anthelmintics
INVENTOR(S): Watson, David Wesley; Heaney, Kathleen; Schwinghammer, Kurt Allen
PATENT ASSIGNEE(S): American Cyanamid Company, USA
SOURCE: Eur. Pat. Appl., \\20363 pp.
CODEN: EPXXDW
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 933027	A1	19990804	EP 1999-300544	19990126
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
JP 11255605	A2	19990921	JP 1999-15636	19990125
ZA 9900692	A	20000728	ZA 1999-692	19990128
BR 9901066	A	20010424	BR 1999-1066	19990128
AU 9914257	A1	19990819	AU 1999-14257	19990129
CN 1236612	A	19991201	CN 1999-101729	19990129

PRIORITY APPLN. INFO.: US 1998-15258 A 19980130

OTHER SOURCE(S): MARPAT 131:126722

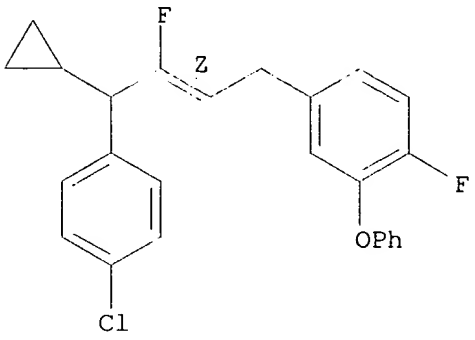
AB The invention relates to methods and compns. for controlling, preventing and protecting animals and humans from infestation and infection by arthropod and helminth parasites, by administering or applying 1,4-diaryl-2-fluoro-2-butene or 1,4-diaryl-2,3-difluoro-2-butene derivs. ArCRR1CF:CZCHAr1R2 [Ar = (un)substituted Ph, naphthyl or heteroaryl; R, R1 = H or (un)substituted (halo)alkyl or (halo)cycloalkyl; RCR1 = (un)substituted cycloalkyl; Z = H or F; R2 = H, Cl, Br, CN, OH or alkoxy; Ar1 = (un)substituted phenoxyphenyl] or their (Z)- or (E)-isomers. Prepn. of the compds. is given.

IT **200401-86-1P 200401-93-0P 200401-94-1P**
200401-95-2P 200401-96-3P 200401-97-4P
200401-98-5P 200401-99-6P 200402-00-2P
200402-02-4P 200402-03-5P 233760-20-8P
233760-21-9P
RL: BUU (Biological use, unclassified); SPN (Synthetic preparation); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
(prepn. as ectoparasiticide and anthelmintic)

RN 200401-86-1 CAPLUS

CN Benzene, 4-[(2Z)-4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

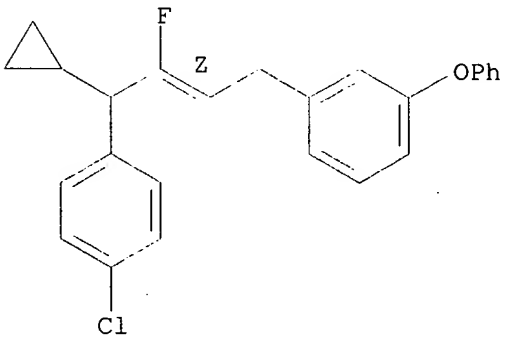
Double bond geometry as shown.



RN 200401-93-0 CAPLUS

CN Benzene, 1-[(2Z)-4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-3-phenoxy- (9CI) (CA INDEX NAME)

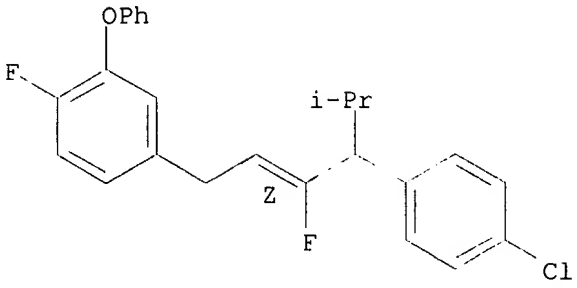
Double bond geometry as shown.



RN 200401-94-1 CAPLUS

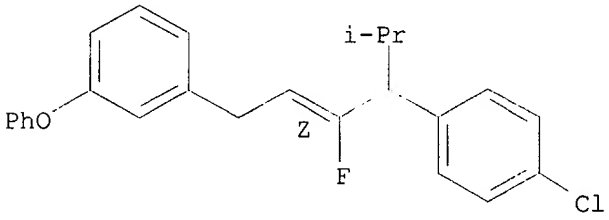
CN Benzene, 4-[(2Z)-4-(4-chlorophenyl)-3-fluoro-5-methyl-2-hexenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



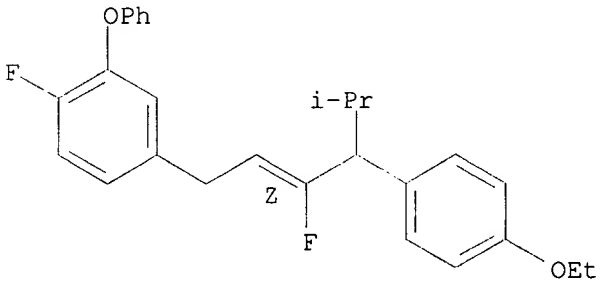
RN 200401-95-2 CAPLUS
CN Benzene, 1-[(2Z)-4-(4-chlorophenyl)-3-fluoro-5-methyl-2-hexenyl]-3-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



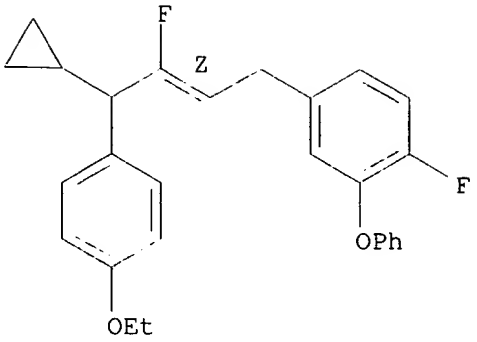
RN 200401-96-3 CAPLUS
CN Benzene, 4-[(2Z)-4-(4-ethoxyphenyl)-3-fluoro-5-methyl-2-hexenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



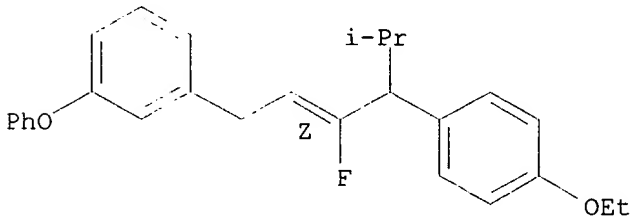
RN 200401-97-4 CAPLUS
CN Benzene, 4-[(2Z)-4-cyclopropyl-4-(4-ethoxyphenyl)-3-fluoro-2-butenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



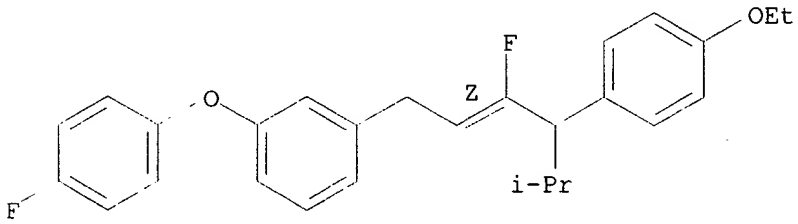
RN 200401-98-5 CAPLUS
CN Benzene, 1-[(2Z)-4-(4-ethoxyphenyl)-3-fluoro-5-methyl-2-hexenyl]-3-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



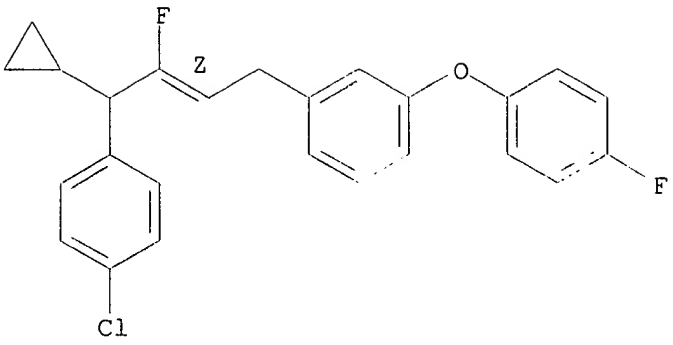
RN 200401-99-6 CAPLUS
CN Benzene, 1-[(2Z)-4-(4-ethoxyphenyl)-3-fluoro-5-methyl-2-hexenyl]-3-(4-fluorophenoxy)- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



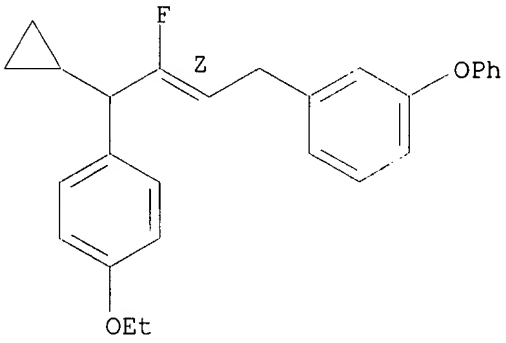
RN 200402-00-2 CAPLUS
CN Benzene, 1-[(2Z)-4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-3-(4-fluorophenoxy)- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



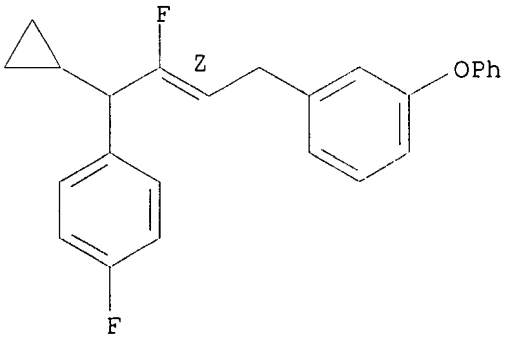
RN 200402-02-4 CAPLUS
CN Benzene, 1-[(2Z)-4-cyclopropyl-4-(4-ethoxyphenyl)-3-fluoro-2-butenyl]-3-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



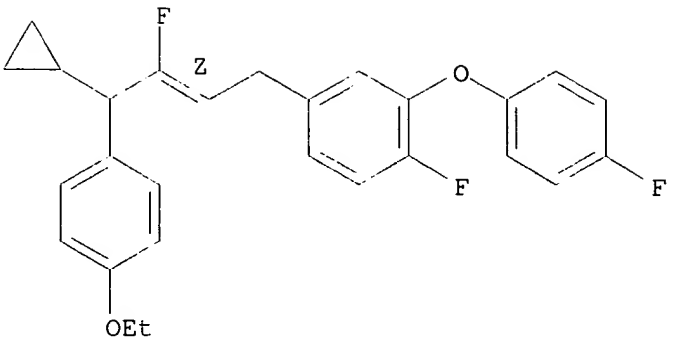
RN 200402-03-5 CAPLUS
CN Benzene, 1-[(2Z)-4-cyclopropyl-3-fluoro-4-(4-fluorophenyl)-2-butenyl]-3-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



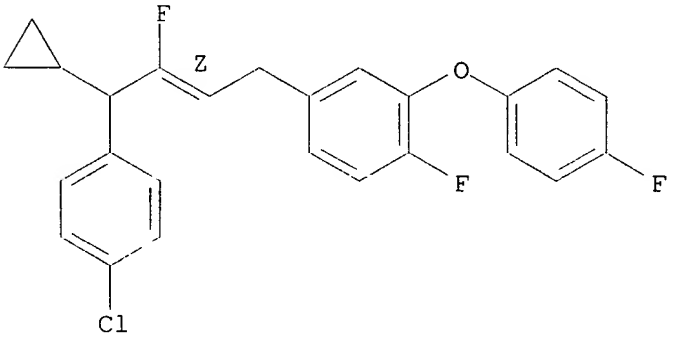
RN 233760-20-8 CAPLUS
CN Benzene, 4-[(2Z)-4-cyclopropyl-4-(4-ethoxyphenyl)-3-fluoro-2-butenyl]-1-fluoro-2-(4-fluorophenoxy)- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



RN 233760-21-9 CAPLUS
CN Benzene, 4-[(2Z)-4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-(4-fluorophenoxy)- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



REFERENCE COUNT: 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

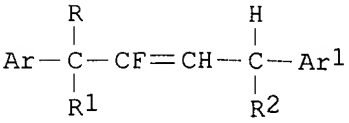
L23 ANSWER 8 OF 15 CAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 1997:801906 CAPLUS
DOCUMENT NUMBER: 128:61344
TITLE: Preparation of 1,4-diaryl-2-fluoro-2-butene insecticidal and acaricidal agents
INVENTOR(S): Barnes, Keith Douglas; Hu, Yulin
PATENT ASSIGNEE(S): American Cyanamid Company, USA
SOURCE: Eur. Pat. Appl., 41 pp.
CODEN: EPXXDW
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 811593	A1	19971210	EP 1997-303657	19970529
EP 811593	B1	20020724		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI				
US 5849958	A	19981215	US 1997-819623	19970317
CN 1167105	A	19971210	CN 1997-105522	19970529
JP 10072385	A2	19980317	JP 1997-154272	19970529
AT 221037	E	20020815	AT 1997-303657	19970529
CA 2206585	AA	19971203	CA 1997-2206585	19970530

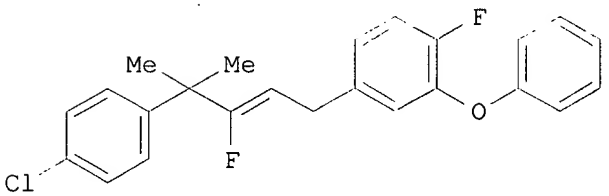
NO 9702502	A	19971204	NO 1997-2502		19970602
AU 9724640	A1	19971211	AU 1997-24640		19970602
AU 729500	B2	20010201			
BR 9703426	A	19980915	BR 1997-3426		19970602
ZA 9704845	A	19981202	ZA 1997-4845		19970602
PRIORITY APPLN. INFO.:			US 1996-660221	A	19960603
			US 1997-819623	A	19970317

OTHER SOURCE(S): MARPAT 128:61344

GI



I



II

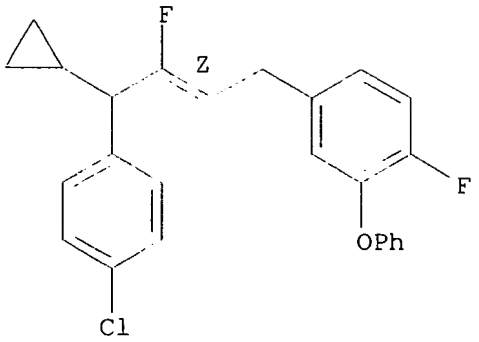
AB The title compds. [I; Ar = (un)substituted Ph; 1- or 2-naphthyl, 5-6 membered heteroaryl; R, R1 = H, C1-4 alkyl, C1-4 haloalkyl, etc.; R2 = H, Cl, Br, CN, OR3; R3 = H, C1-4 alkyl; Ar1 = (un)substituted phenoxyphenyl], useful for the control of insect and acarid pests, were prepd. Thus, reaction of (Z)-1-bromo-4-(p-chlorophenyl)-3-fluoro-4-methyl-2-pentene with 4-fluoro-3-phenoxybenzeneboronic acid in the presence of Pd(dba)2 and K2CO3 in PhMe/EtOH afforded 86% (Z)-II which showed 100% control against, e.g., southern armyworm and western corn rootworm.

IT **200401-86-1P 200401-93-0P 200401-94-1P**
200401-95-2P 200401-96-3P 200401-97-4P
200401-98-5P 200401-99-6P 200402-00-2P
200402-01-3P 200402-02-4P 200402-03-5P
RL: AGR (Agricultural use); BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); SPN (Synthetic preparation); BIOL (Biological study); PREP (Preparation); USES (Uses)
(prepn. of 1,4-diaryl-2-fluoro-2-butene insecticidal and acaricidal agents)

RN 200401-86-1 CAPLUS

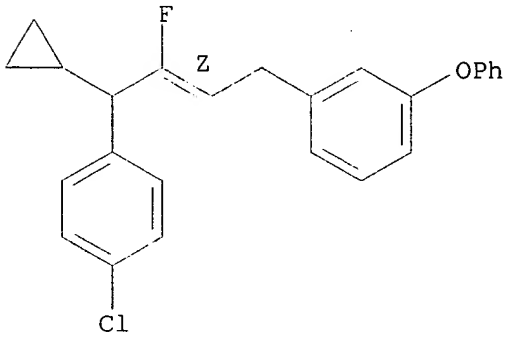
CN Benzene, 4-[(2Z)-4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



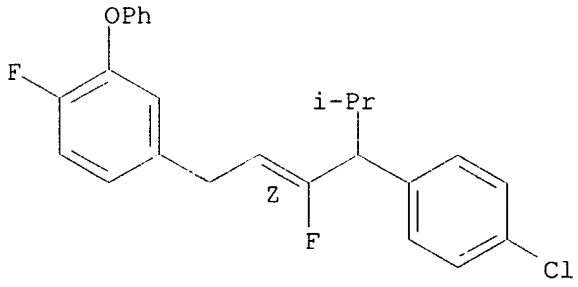
RN 200401-93-0 CAPLUS
CN Benzene, 1-[(2Z)-4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-3-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



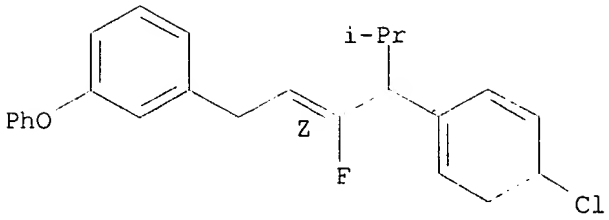
RN 200401-94-1 CAPLUS
CN Benzene, 4-[(2Z)-4-(4-chlorophenyl)-3-fluoro-5-methyl-2-hexenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



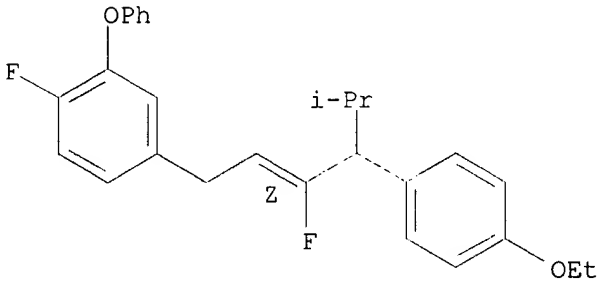
RN 200401-95-2 CAPLUS
CN Benzene, 1-[(2Z)-4-(4-chlorophenyl)-3-fluoro-5-methyl-2-hexenyl]-3-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



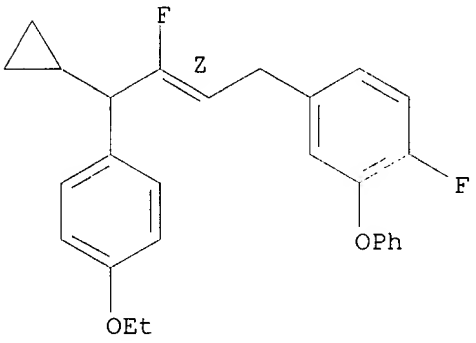
RN 200401-96-3 CAPLUS
CN Benzene, 4-[(2Z)-4-(4-ethoxyphenyl)-3-fluoro-5-methyl-2-hexenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



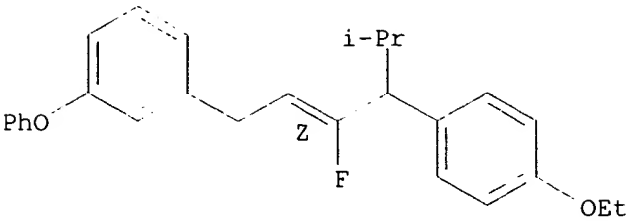
RN 200401-97-4 CAPLUS
CN Benzene, 4-[(2Z)-4-cyclopropyl-4-(4-ethoxyphenyl)-3-fluoro-2-butenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



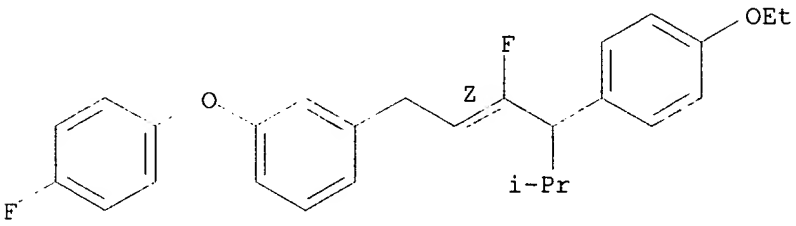
RN 200401-98-5 CAPLUS
CN Benzene, 1-[(2Z)-4-(4-ethoxyphenyl)-3-fluoro-5-methyl-2-hexenyl]-3-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



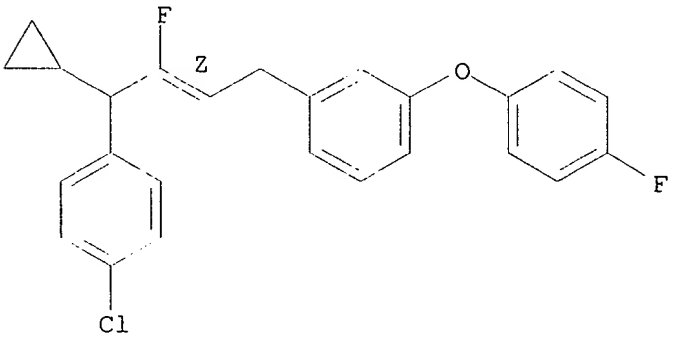
RN 200401-99-6 CAPLUS
CN Benzene, 1-[(2Z)-4-(4-ethoxyphenyl)-3-fluoro-5-methyl-2-hexenyl]-3-(4-fluorophenoxy)- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



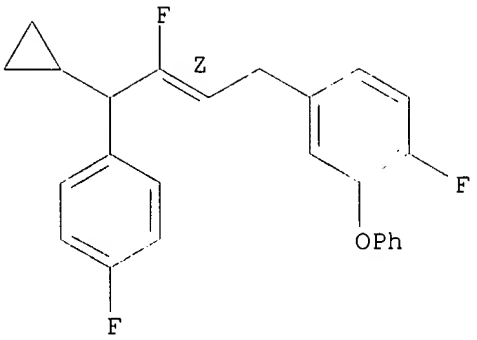
RN 200402-00-2 CAPLUS
CN Benzene, 1-[(2Z)-4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-3-(4-fluorophenoxy)- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



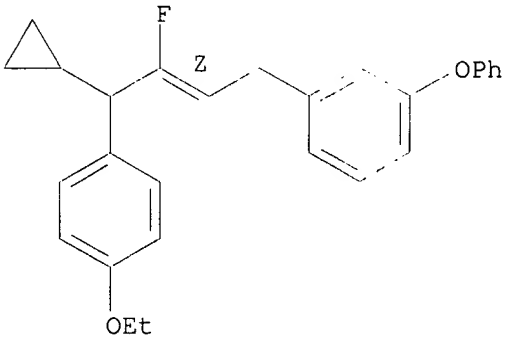
RN 200402-01-3 CAPLUS
CN Benzene, 4-[(2Z)-4-cyclopropyl-3-fluoro-4-(4-fluorophenyl)-2-butenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



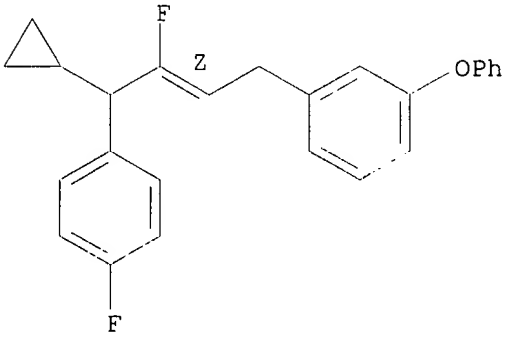
RN 200402-02-4 CAPLUS
CN Benzene, 1-[(2Z)-4-cyclopropyl-4-(4-ethoxyphenyl)-3-fluoro-2-butenyl]-3-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



RN 200402-03-5 CAPLUS
CN Benzene, 1-[(2Z)-4-cyclopropyl-3-fluoro-4-(4-fluorophenyl)-2-butenyl]-3-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



L23 ANSWER 9 OF 15 CAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 1998:47394 CAPLUS
DOCUMENT NUMBER: 128:140757
TITLE: Nucleophilic addition of trimethylsilylamines to 2-halo-2-alkenals
AUTHOR(S): Rulev, A. Yu.; Kuznetsova, T. A.; Mokov, A. S.; Sherstyannikova, L. V.; Keiko, N. A.; Voronkov, M. G.

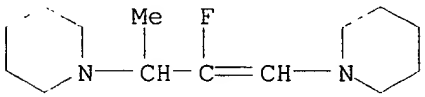
Searched by Barb O'Bryen, STIC 308-4291

CORPORATE SOURCE: Siberian Division, Institute of Organic Chemistry, Russian Academy of Sciences, Irkutsk, 664033, Russia
SOURCE: Russian Journal of Organic Chemistry (Translation of Zhurnal Organicheskoi Khimii) (1997), 33(1), 26-28
CODEN: RJOCEQ; ISSN: 1070-4280
PUBLISHER: MAIK Nauka/Interperiodica Publishing
DOCUMENT TYPE: Journal
LANGUAGE: English

AB 2-Halo-2-alkenals react with trimethylsilyl derivs. of secondary amines to give the products of 1,2-and 1,4-addn. Both the structure of the starting aldehyde and the nature of the substituent at the N atom are responsible for reaction selectivity.

IT **176374-20-2P**
RL: SPN (Synthetic preparation); PREP (Preparation)
(prepn. of)

RN 176374-20-2 CAPLUS
CN Piperidine, 1,1'-(2-fluoro-3-methyl-1-propene-1,3-diyl)bis- (9CI) (CA INDEX NAME)

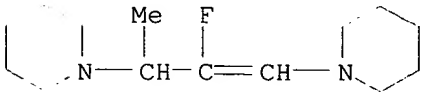


L23 ANSWER 10 OF 15 CAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 1996:134963 CAPLUS
DOCUMENT NUMBER: 124:316943
TITLE: Reactions of .alpha.-halo .alpha.,.beta.-unsaturated aldehydes with secondary amines
AUTHOR(S): Rulev, A. Yu.; Keiko, N. A.; Voronkov, M. G.
CORPORATE SOURCE: Irkutsk Inst. Org. Chem., Irkutsk, 664033, Russia
SOURCE: Izvestiya Akademii Nauk, Seriya Khimicheskaya (1996), (1), 135-8
CODEN: IASKEA
PUBLISHER: Institut Organicheskoi Khimii im. N. D. Zelinskogo Rossiiskoi Akademii Nauk
DOCUMENT TYPE: Journal
LANGUAGE: Russian

AB Reactions of 2-halo-2-alkenals R2R1C:C(X)CHO with acyclic or cyclic secondary amines R2NH lead to both the product of ipso-substitution of the halogen atom and the products of fragmentation and condensation: 1,2-diaminoethenes R2NCH:CHNR2, carbonyl compds. R2COR1, 1,3-diamino-2-haloolefins R2R1(R2N)CC(X):CHNR2, and formamides R2NCHO. The ratio of competitive reactions depends on the structure of the initial aldehyde, the nature of amine, and exptl. conditions.

IT **176374-20-2P**
RL: SPN (Synthetic preparation); PREP (Preparation)
(reactions of .alpha.-halo .alpha.,.beta.-unsatd. aldehydes with secondary amines)

RN 176374-20-2 CAPLUS
CN Piperidine, 1,1'-(2-fluoro-3-methyl-1-propene-1,3-diyl)bis- (9CI) (CA INDEX NAME)



L23 ANSWER 11 OF 15 USPATFULL
ACCESSION NUMBER: 2002:55187 USPATFULL
TITLE: Process for the preparation of chiral isofluoroenes
INVENTOR(S): Chiarello, John Francis, Newtown, PA, UNITED STATES
Buckwalter, Brian Lee, Yardley, PA, UNITED STATES
Barden, Timothy Claude, Holland, PA, UNITED STATES
PATENT ASSIGNEE(S): BASF Aktiengesellschaft, Ludwigshafen, GERMANY, FEDERAL REPUBLIC OF (U.S. corporation)

	NUMBER	KIND	DATE
PATENT INFORMATION:	US 2002032351	A1	20020314
APPLICATION INFO.:	US 2001-921188	A1	20010802 (9)

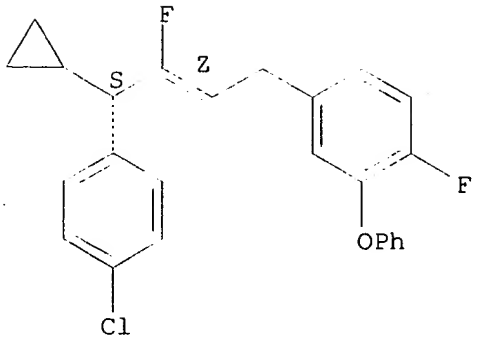
	NUMBER	DATE
PRIORITY INFORMATION:	US 2000-222733P	20000803 (60)

DOCUMENT TYPE: Utility
FILE SEGMENT: APPLICATION
LEGAL REPRESENTATIVE: Susan Shaw, Intellectual Property Department, BASF Corporation, 3000 Continental Drive - North, Mount Olive, NJ, 07828-1234
NUMBER OF CLAIMS: 11
EXEMPLARY CLAIM: 1
LINE COUNT: 1076
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB There is provided a process for the preparation of a chiral insecticidal and acaricidal compound of formula I. ##STR1##

Also provided are intermediate compounds useful in the process of the present invention.

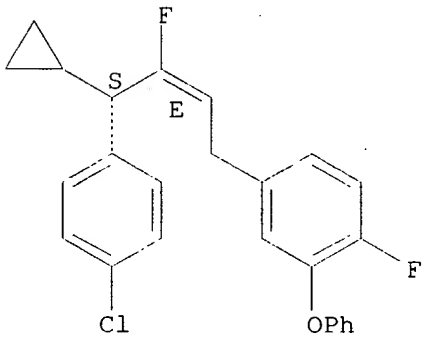
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
IT **398453-72-0P**, 4-[(2Z,4S)-4-(4-Chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-phenoxybenzene **398453-73-1P**, 4-[(2E,4S)-4-(4-Chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-phenoxybenzene **398453-74-2P**, 4-[(2E,4R)-4-(4-Chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-phenoxybenzene **398453-75-3P**, 4-[(2Z,4R)-4-(4-Chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-phenoxybenzene
(process for prepn. of chiral insecticidal and acaricidal diarylfluorobutenes via enzymic hydrolysis of (4-chlorophenyl)cyclopropylethanoic acid Me ester using esterase)
RN 398453-72-0 USPATFULL
CN Benzene, 4-[(2Z,4S)-4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

Absolute stereochemistry.
Double bond geometry as shown.



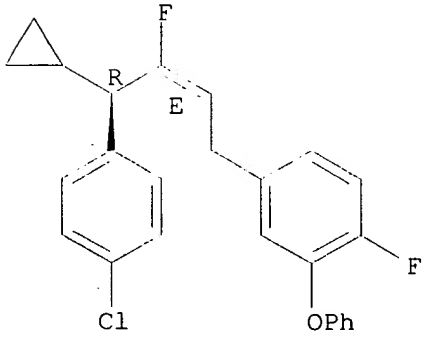
RN 398453-73-1 USPATFULL
CN Benzene, 4-[(2E,4S)-4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

Absolute stereochemistry.
Double bond geometry as shown.



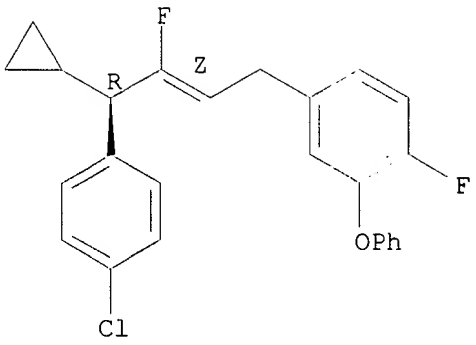
RN 398453-74-2 USPATFULL
CN Benzene, 4-[(2E,4R)-4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

Absolute stereochemistry.
Double bond geometry as shown.



RN 398453-75-3 USPATFULL
CN Benzene, 4-[(2Z,4R)-4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

Absolute stereochemistry.
Double bond geometry as shown.



L23 ANSWER 12 OF 15 USPATFULL
ACCESSION NUMBER: 2002:32732 USPATFULL
TITLE: Process for the preparation of 1,4-diaryl-2-fluoro-4-cyano-2-butenes and intermediates useful therefor
INVENTOR(S): Hu, Yulin, Plainsboro, NJ, UNITED STATES
Hunt, David Allen, Clifton Park, NY, UNITED STATES
PATENT ASSIGNEE(S): Intl Prop Dept, BASF Aktiengesellschaft, Ludwigshafen, GERMANY, FEDERAL REPUBLIC OF (U.S. corporation)

	NUMBER	KIND	DATE	
PATENT INFORMATION:	US 2002019556	A1	20020214	
	US 6444838	B2	20020903	
APPLICATION INFO.:	US 2001-849298	A1	20010504	(9)

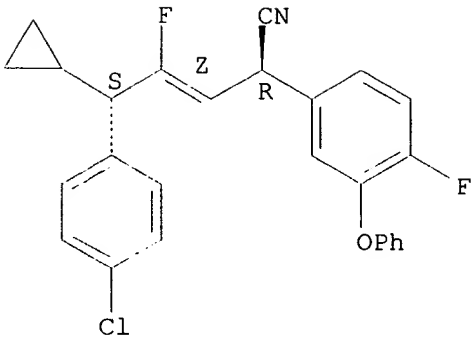
	NUMBER	DATE
PRIORITY INFORMATION:	US 2000-201826P	20000504 (60)

DOCUMENT TYPE: Utility
FILE SEGMENT: APPLICATION
LEGAL REPRESENTATIVE: BASF Corporation, Intellectual Property Department, P.O. Box 400, Princeton, NJ, 08543-0400
NUMBER OF CLAIMS: 15
EXEMPLARY CLAIM: 1
LINE COUNT: 471
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The present invention provides a process for the preparation of pesticidal 1,4-diaryl-2-fluoro-4-cyano-2 -butene compounds having the structural formula I ##STR1##

and intermediates useful therefor

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
IT **371759-00-1P**
(prepn. of)
RN 371759-00-1 USPATFULL
CN Benzeneacetonitrile, .alpha.-[(1Z,3R)-3-(4-chlorophenyl)-3-cyclopropyl-2-fluoro-1-propenyl]-4-fluoro-3-phenoxy-, (.alpha.S)-rel- (9CI) (CA INDEX NAME)

Relative stereochemistry.
Double bond geometry as shown.



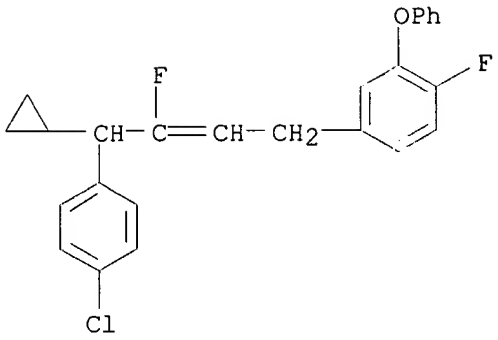
L23 ANSWER 13 OF 15 USPATFULL
ACCESSION NUMBER: 2002:19447 USPATFULL
TITLE: 1,4-diaryl-2-fluoro-1-buten-3-ol compounds and their use in the preparation of 1,4-diaryl-2-fluoro-1,3-butadiene and 1,4-diaryl-2-fluoro-2-butene compounds
INVENTOR(S): Hu, Yulin, Plainsboro, NJ, United States
Hunt, David Allen, Clifton Park, NY, United States
PATENT ASSIGNEE(S): BASF Aktiengesellschaft, Ludwigshafen, GERMANY, FEDERAL REPUBLIC OF (non-U.S. corporation)

	NUMBER	KIND	DATE	
PATENT INFORMATION:	US 6342642	B1	20020129	
	WO 2000029362		20000525	
APPLICATION INFO.:	US 2001-856229		20010813	(9)
	WO 1999-US26434		19991109	
			20010813	PCT 371 date

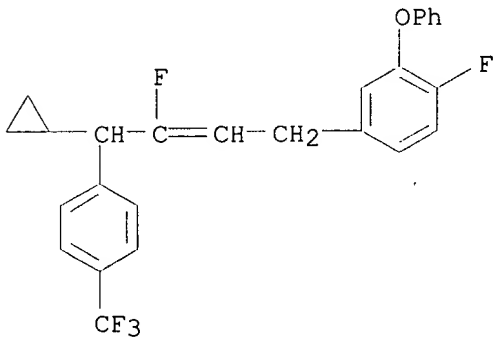
DOCUMENT TYPE: Utility
FILE SEGMENT: GRANTED
PRIMARY EXAMINER: Shippen, Michael L.
LEGAL REPRESENTATIVE: Maurer, Barbara V.
NUMBER OF CLAIMS: 32
EXEMPLARY CLAIM: 1
NUMBER OF DRAWINGS: 0 Drawing Figure(s); 0 Drawing Page(s)
LINE COUNT: 851
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The present invention provides novel 1,4-diaryl-2-fluoro-1-buten-3-ol compounds of the structural formula I ##STR1##

a method for the preparation of those formula I compounds, and the use of those formula I compounds in the preparation of 1,4-diaryl-2-fluoro-1,3-butadiene compounds of formula II and 1,4-diaryl-2-fluoro-2-butene compounds of formula III ##STR2##

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
IT **269398-40-5P 269398-41-6P**
(prepn. of diarylfluorobutenol compds. and their use in the prepn. of butadiene and butene derivs.)
RN 269398-40-5 USPATFULL
CN Benzene, 4-[4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)



RN 269398-41-6 USPATFULL
CN Benzene, 4-[4-cyclopropyl-3-fluoro-4-[4-(trifluoromethyl)phenyl]-2-butenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)



L23 ANSWER 14 OF 15 USPATFULL

ACCESSION NUMBER:	2001:158535 USPATFULL
TITLE:	Processes for the preparation of 2-arylvinyl alkyl ether and 1,4-diaryl-2-fluoro-2-butene compounds
INVENTOR(S):	Hu, Yulin, Plainsboro, NJ, United States Hunt, David Allen, Newtown, PA, United States Liu, Weiguo, Lawrenceville, NJ, United States
PATENT ASSIGNEE(S):	American Cyanamid Co., Madison, NJ, United States (U.S. corporation)

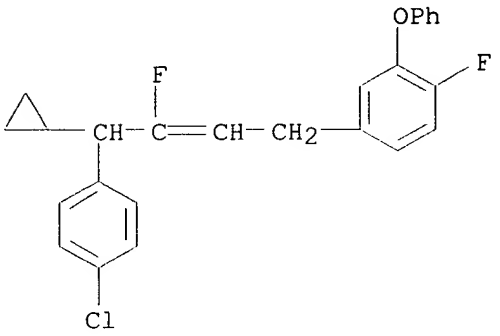
	NUMBER	KIND	DATE	
PATENT INFORMATION:	US 6291721	B1	20010918	
APPLICATION INFO.:	US 1999-373262		19990812	(9)
DOCUMENT TYPE:	Utility			
FILE SEGMENT:	GRANTED			
PRIMARY EXAMINER:	Keys, Rosalynd			
LEGAL REPRESENTATIVE:	Maurer, Barbara V.			
NUMBER OF CLAIMS:	22			
EXEMPLARY CLAIM:	1			
LINE COUNT:	894			

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB An improved process for the preparation of 2-arylvinyl alkyl ether compounds of the structural formula I ##STR1##

In addition, the present invention provides an improved process for the preparation of 1,4-diaryl-2-fluoro-2-butene compounds of the structural formula V ##STR2##

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
IT **269398-40-5P**
(prepn. of 2-arylvinyl alkyl ethers and 1,4-diaryl-2-fluoro-2-butenes)
RN 269398-40-5 USPATFULL
CN Benzene, 4-[4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)



L23 ANSWER 15 OF 15 USPATFULL

ACCESSION NUMBER:	1998:157555 USPATFULL
TITLE:	1,4,diaryl-2-fluoro-2-butene insecticidal and acaricidal agents
INVENTOR(S):	Barnes, Keith D., Newtown, PA, United States Hu, Yulin, Plainsboro, NJ, United States
PATENT ASSIGNEE(S):	American Cyanamid Company, Madison, NJ, United States (U.S. corporation)

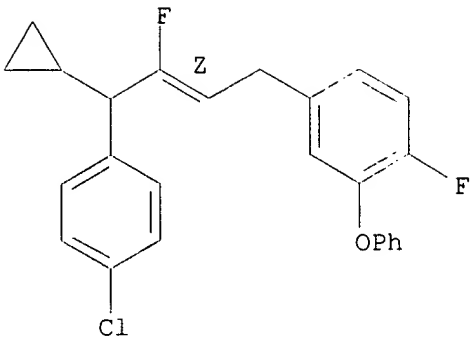
	NUMBER	KIND	DATE	
PATENT INFORMATION:	US 5849958		19981215	
APPLICATION INFO.:	US 1997-819623		19970317	(8)

DOCUMENT TYPE:	Utility
FILE SEGMENT:	Granted
PRIMARY EXAMINER:	Geist, Gary
ASSISTANT EXAMINER:	Padmanabhan, Sreeni
LEGAL REPRESENTATIVE:	Mazzarese, Joseph M.
NUMBER OF CLAIMS:	6
EXEMPLARY CLAIM:	1
LINE COUNT:	934

CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB Pesticidal 1,4-diaryl-2-fluoro-2-butene compounds having the structural formula I ##STR1## and compositions and methods comprising those compounds for the control of insect and acarid pests.

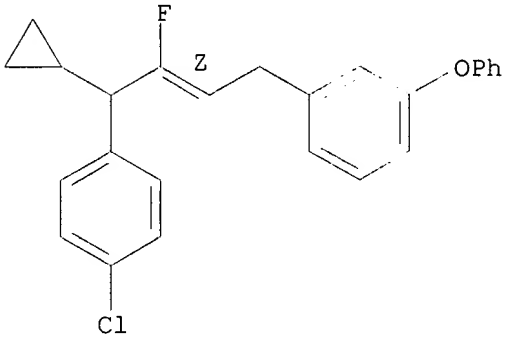
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
IT **200401-86-1P 200401-93-0P 200401-94-1P**
200401-95-2P 200401-96-3P 200401-97-4P
200401-98-5P 200401-99-6P 200402-00-2P
200402-01-3P 200402-02-4P 200402-03-5P
(prepn. of 1,4-diaryl-2-fluoro-2-butene insecticidal and acaricidal agents)
RN 200401-86-1 USPATFULL
CN Benzene, 4-[(2Z)-4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



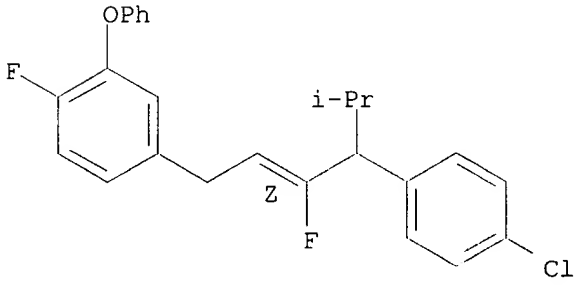
RN 200401-93-0 USPATFULL
CN Benzene, 1-[(2Z)-4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-3-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



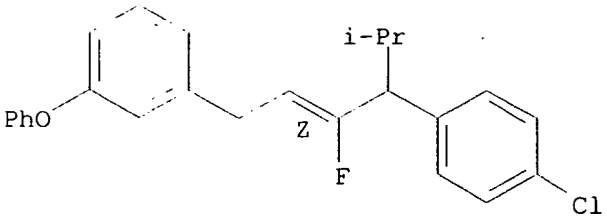
RN 200401-94-1 USPATFULL
CN Benzene, 4-[(2Z)-4-(4-chlorophenyl)-3-fluoro-5-methyl-2-hexenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



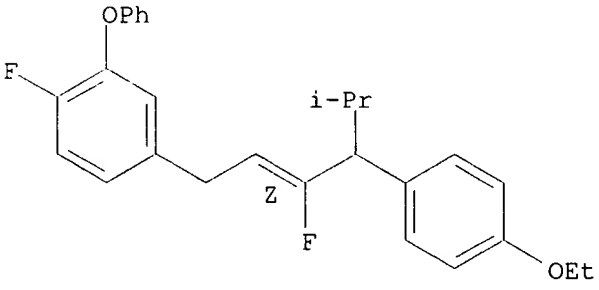
RN 200401-95-2 USPATFULL
CN Benzene, 1-[(2Z)-4-(4-chlorophenyl)-3-fluoro-5-methyl-2-hexenyl]-3-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



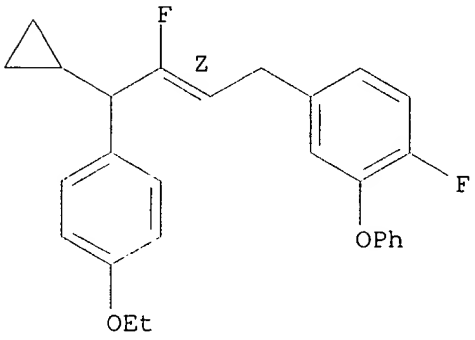
RN 200401-96-3 USPATFULL
CN Benzene, 4-[(2Z)-4-(4-ethoxyphenyl)-3-fluoro-5-methyl-2-hexenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



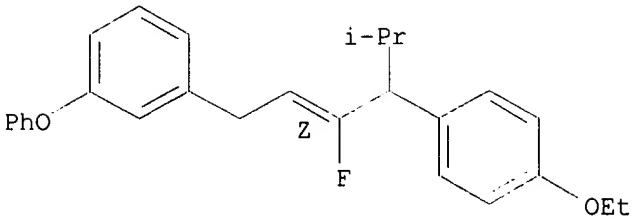
RN 200401-97-4 USPATFULL
CN Benzene, 4-[(2Z)-4-cyclopropyl-4-(4-ethoxyphenyl)-3-fluoro-2-butenyl]-1-fluoro-2-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



RN 200401-98-5 USPATFULL
CN Benzene, 1-[(2Z)-4-(4-ethoxyphenyl)-3-fluoro-5-methyl-2-hexenyl]-3-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



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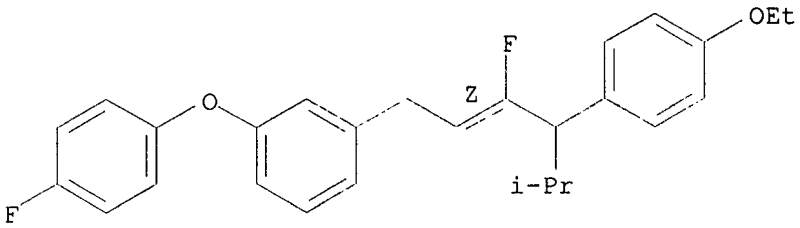
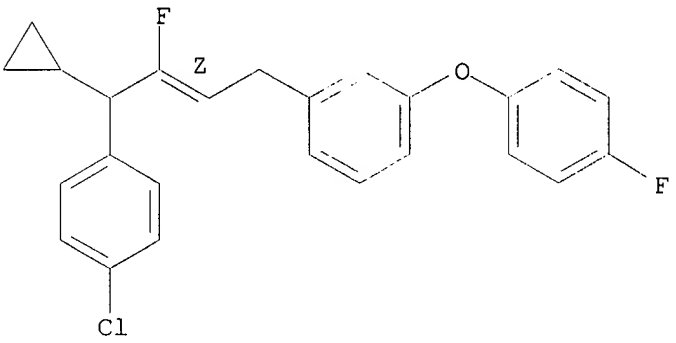
Double bond geometry as shown.



RN 200402-00-2 USPATFULL
CN Benzene, 1-[(2Z)-4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-3-(4-fluorophenoxy)- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



RN 200402-01-3 USPATFULL
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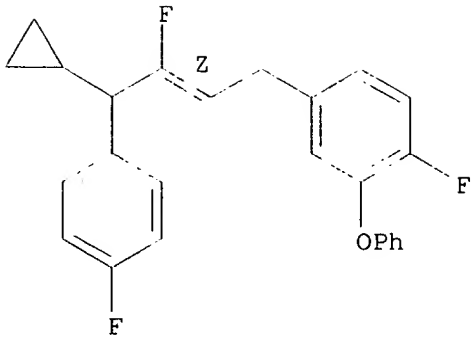
Double bond geometry as shown.



RN 200402-02-4 USPATFULL
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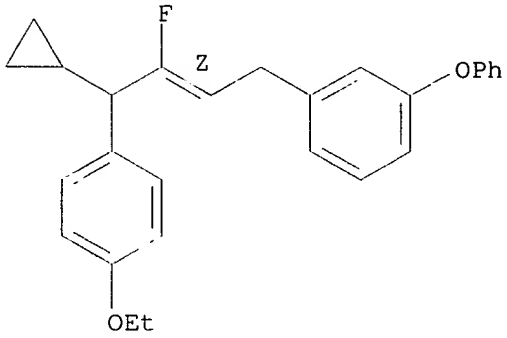
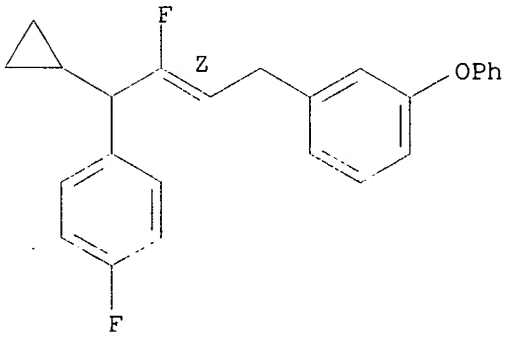
Double bond geometry as shown.



RN 200402-03-5 USPATFULL
CN Benzene, 1-[(2Z)-4-cyclopropyl-3-fluoro-4-(4-fluorophenyl)-2-butenyl]-3-phenoxy- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



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FILE COVERS 1907-1966
FILE LAST UPDATED: 01 May 1997 (19970501/UP)

This file contains CAS Registry Numbers for easy and accurate substance identification. Title keywords, authors, patent assignees, and patent information, e.g., patent numbers, are now searchable from 1907-1966. TIFF images of CA abstracts printed between 1907-1966 are available in the PAGE display formats.

This file supports REG1stRY for direct browsing and searching of all substance data from the REGISTRY file. Enter HELP FIRST for more information.

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Some records from 1974 to 1991 are derived from the ZIC/VINITI data file
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Crossover limits have been increased.  See HELP RNCROSSOVER for details.

Structure search limits have been raised.  See HELP SLIMIT for the new,
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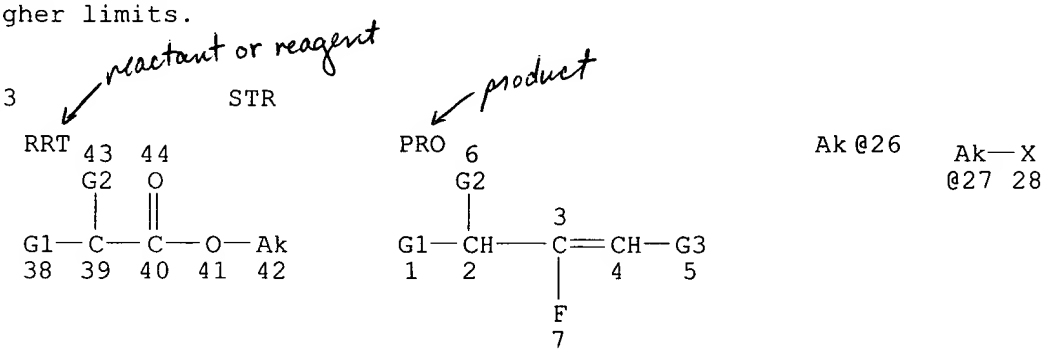


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L35 ANSWER 1 OF 1 CASREACT COPYRIGHT 2003 ACS
ACCESSION NUMBER: 136:183615 CASREACT
TITLE: Process for the preparation of chiral insecticidal and acaricidal 1,4-diaryl-2-fluoro-2-butenes via enzymic hydrolysis of (4-chlorophenyl)cyclopropylethanoic acid methyl ester using esterase
INVENTOR(S): Chiarello, John Francis; Buckwalter, Brian Lee; Barden, Timothy Claude
PATENT ASSIGNEE(S): Basf Aktiengesellschaft, Germany
SOURCE: PCT Int. Appl., 75 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002012155	A2	20020214	WO 2001-EP9012	20010803
WO 2002012155	A3	20021128		
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PRIORITY APPLN. INFO.:			US 2000-222733P	20000803
			WO 2001-EP9012	20010803

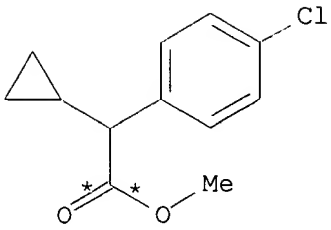
OTHER SOURCE(S): MARPAT 136:183615

AB There is provided a process for the prepn. of a chiral compd. of formula ArC*H(R)CF:CHAr1 [I; Ar, Ar1 = (un)substituted aryl or a 5- or 6-membered heteroarom. ring; R is C1-4 alkyl, C1-4 haloalkyl, C3-6 cycloalkyl or C3-6 halocycloalkyl; Ar1 , is aryl or a 5- or 6-membered heteroarom. ring; C* represents an asym. center] which is useful as an insecticidal and acaricidal agent and for protecting plants from damage caused by insect and acarid attack and infestation (no data). Also provided are intermediate compds. useful in the process of the present invention. This process comprises (a) treating a racemic ester of formula ArCH(R)CO2R4 (II; Ar, R = same as above; R4 = C1-4 alkyl) with an esterase to form a first mixt. of either R-acid of formula ArCH(R)CO2H (III) and S-ester of formula II or of S-acid of formula III and R-ester of formula II, (b) sepg. (R)- or (S)-acid III from said (S)- or (R)-ester II, (c) reducing the chiral acid (R)- or (S)-acid III or (S)- or (R)-ester II to obtain a chiral alc. of formula (R)- or (S)-ArC*H(R)CH2OH, (d) transforming the chiral alc. into an ester (R)- or (S)-ArC*H(R)CH2CO2R1, (e) fluorinating the latter ester to afford a fluoro-ester (R)- or (S)-ArC*H(R)CHFCO2R1, and (f) reacting the latter fluoro-ester with an aldehyde Ar1CH2CHO (Ar1 = same as above) in a solvent in the presence of a base to afford a second mixt. of 4 chiral diastereomeric hydroxy-esters ArC*H(R)CHF(CO2R1)CH(OH)CH2Ar1. It further comprises (g) optionally sepg. the second mixt. into a third mixt. each having two chiral diastereomers,

(h) treating the hydroxy-ester mixts. with an acylating agent R2COX1 (R2 = C1-4 alkyl; X1 = Cl, Br, R2CO2) to afford a fifth mixt. of 4 chiral diastereomeric acyloxy esters or a seventh mixt. of two chiral diastereomeric acyloxy esters ArC*H(R)CHF(CO2R1)CH(O2CR2)CH2Ar1, (i) optionally sepg. the sixth or seventh mixt. not essentially pure chiral diastereomeric acyloxy ester, (j) hydrolyzing the pure acyloxy esters or mixts. of esters to afford a hydroxy acid ArC*H(R)CHF(CO2H)CH(OH)CH2Ar1, and (k) heating the hydroxy acid with a arylsulfonyl halide to afford I. Thus, Me (2RS)-(4-chlorophenyl)(cyclopropyl)ethanoate was treated with horse liver esterase in water (pH 7.5) to give 37.9% (2R)-(4-chlorophenyl)(cyclopropyl)ethanoic acid and 36.2% Me (2S)-(4-chlorophenyl)(cyclopropyl)ethanoate, each of which was reduced by BH3.THF/THF at room temp. for 4 h and DIBAL/CH2Cl2 warming from -78.degree. to room temp. and at room temp. for 1 h, resp., to give 84% (2R)-(4-chlorophenyl)(cyclopropyl)ethanol and 80% (2S)-(4-chlorophenyl)(cyclopropyl)ethanol, resp. Each of (2R)- and (2S)-(4-chlorophenyl)(cyclopropyl)ethanol was tosylated by tosyl chloride in the presence of Et3N in CH2Cl2 to (2R)- and (2S)-(4-chlorophenyl)(cyclopropyl)ethyl p-toluenesulfonate, resp., which underwent cyanation with NaCN in DMSO at 90.degree. for 3 h to give (2R)- and (2S)-3-(4-chlorophenyl)-3-cyclopropylpropanenitrile, resp. Alkali hydrolysis of (2R)- and (2S)-3-(4-chlorophenyl)-3-cyclopropylpropanenitrile in a mixt. of 10% aq. NaOH and methanol under reflux for 18 h followed by acidification with concd. HCl gave (2R)- and (2S)-3-(4-chlorophenyl)-3-cyclopropylpropanoic acid, resp., which was esterified with MeOH in the presence of HCl at room temp. for 18 h gave Me (2R)- and (2S)-3-(4-chlorophenyl)-3-cyclopropylpropanoate, resp. Lithiation of the each ester with lithium diisopropylamide (LDA) in THF at -78.degree. to 0.degree. followed by fluorination with (PhSO2)2NF at -78.degree. to room temp. and room temp. for 2 h gave Me (2R)- and (2S)-3-(4-chlorophenyl)-3-cyclopropyl-2-fluoropropanoate, resp. Lithiation of Me (2S)-3-(4-chlorophenyl)-3-cyclopropyl-2-fluoropropanoate with LDA in THF at -78.degree. for 15 min followed by addn. reaction with 4-fluoro-3-phenoxyphenylacetaldehyde at -78.degree. for 2 h gave, after silica gel chromatog., an oil (A) contg. (2R,3R) and (2R,3S) or (2S,3R)-Me 2-[(S)-(4-chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)-3-hydroxybutanoate and an oil contg. (2S,3S) and (2S,3R) or (2R,3S)-Me 2-[(S)-(4-chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)-3-hydroxybutanoate (steps f and g). Acetylation of the oil A with Ac2O in the presence of DAMP in CH2Cl2 at room temp. for 2 h gave Me (2R,3R)-3-(acetyloxy)-2-[(S)-(4-chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)butanoate and Me (2R,3S or 2S,3R)-3-(acetyloxy)-2-[(S)-(4-chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)butanoate (step h and i). Alkali hydrolysis of the latter diastereomer in a mixt. of 10% aq. NaOH, MeOH, and THF under reflux for 1 h gave (2S,3R or 2R,3S)-2-[(S)-(4-chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)-3-hydroxybutanoic acid (step j) which was heated with tosyl chloride in collidine at 170.degree. for 2 h to give 4-[(2Z,4S)-4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-phenoxybenzene as a colorless oil (step k).

RX(349) OF 398 COMPOSED OF RX(3), RX(1), RX(4), RX(6), RX(9), RX(12), RX(14), RX(30), RX(25), RX(29)

RX(349) 5 **G** + J + O + 4 V + 4 AD + 2 BG ===> **BF**



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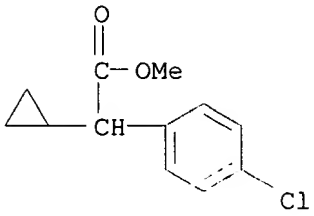

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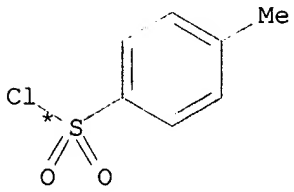

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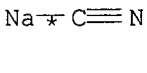

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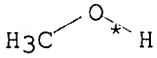

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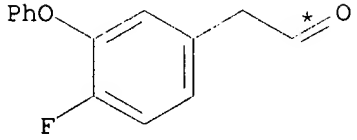

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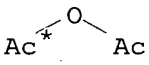
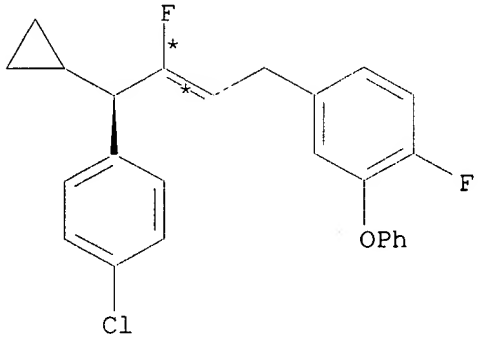


2 BG

10
STEPS



BF

RX(3) RCT G **119544-56-8**
PRO A 398453-51-5, E 398453-52-6
CAT 9016-18-6 Carbonic esterase
SOL 7732-18-5 Water
NTE biotransformation; enzymic stereoselective hydrolysis at room temp. and pH 7.1-8.0

RX(1) RCT A 398453-51-5
RGT C 14044-65-6 BH3-THF
PRO B 119544-59-1
SOL 109-99-9 THF
NTE redn. at room temp. for 4 h

RX(4) RCT B 119544-59-1, J 98-59-9
RGT L 121-44-8 Et3N
PRO K 398453-53-7
SOL 75-09-2 CH2Cl2
NTE tosylation at room temp. for 3 days

RX(6) RCT K 398453-53-7, O 143-33-9
PRO P 398453-55-9

SOL 67-68-5 DMSO
NTE cyanation at 90.degree. for 3 h

RX(9) RCT P 398453-55-9, V 67-56-1
PRO W 398453-59-3
CAT 7647-01-0 HCl
NTE alkali hydrolysis under reflux for 18 h; acidification at 0.degree.

RX(12) RCT W 398453-59-3

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RGT AB 133745-75-2 (PhSO2)NF
PRO Z 398453-61-7
NTE deprotonation at -78.degree. to 0.degree. over 5 min; fluorination at room temp. for 2 h

RX(14) RCT Z 398453-61-7

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RCT AD 117252-07-0
PRO AE 398464-67-0, AF 398464-69-2, AG 398464-70-5, AH 398464-71-6
NTE deprotonation at -78.degree. for 15 min; addn. reaction at -78.degree. for 2 h

RX(30) RCT AE 398464-67-0, AG 398464-70-5, BG 108-24-7
PRO BH 398453-68-4, BC 398453-80-0
CAT 1122-58-3 4-DMAP
SOL 75-09-2 CH2Cl2
NTE acetylation at room temp. for 2 h

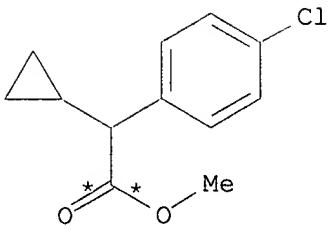
RX(25) RCT BC 398453-80-0

STAGE(1)
RGT T 1310-73-2 NaOH
SOL 67-56-1 MeOH, 7732-18-5 Water

STAGE(2)
RGT U 7647-01-0 HCl
SOL 141-78-6 AcOEt
PRO BD 398453-84-4
NTE sapon. under reflux for 1 h; acidification with concd. HCl

RX(29) RCT BD 398453-84-4
RGT J 98-59-9 TsCl
PRO BF **398453-75-3**
SOL 29611-84-5 Collidine
NTE decarboxylation and dehydration (olefination) at 170.degree. for 2 h

RX(350) OF 398 COMPOSED OF RX(3), RX(1), RX(4), RX(6), RX(9), RX(12), RX(14), RX(31), RX(25), RX(29)
RX(350) 5 **G** + J + O + 4 V + 4 AD + 2 BG ===> **BF**



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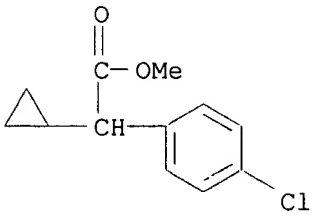

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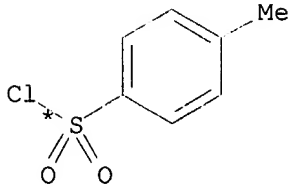

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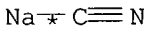

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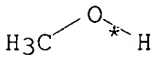

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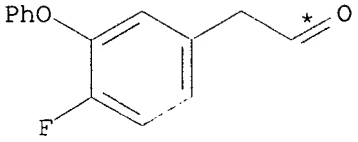

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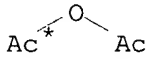
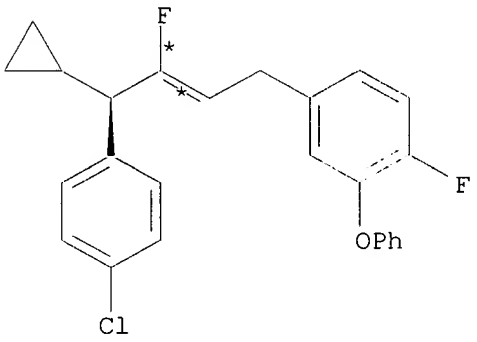


2 BG

10 STEPS



BF

RX(3) RCT G **119544-56-8**
PRO A 398453-51-5, E 398453-52-6
CAT 9016-18-6 Carbonic esterase
SOL 7732-18-5 Water
NTE biotransformation; enzymic stereoselective hydrolysis at room temp. and pH 7.1-8.0

RX(1) RCT A 398453-51-5
RGT C 14044-65-6 BH3-THF
PRO B 119544-59-1
SOL 109-99-9 THF
NTE redn. at room temp. for 4 h

RX(4) RCT B 119544-59-1, J 98-59-9
RGT L 121-44-8 Et3N
PRO K 398453-53-7

SOL 75-09-2 CH2Cl2
NTE tosylation at room temp. for 3 days

RX(6) RCT K 398453-53-7, O 143-33-9
PRO P 398453-55-9
SOL 67-68-5 DMSO
NTE cyanation at 90.degree. for 3 h

RX(9) RCT P 398453-55-9, V 67-56-1
PRO W 398453-59-3
CAT 7647-01-0 HCl
NTE alkali hydrolysis under reflux for 18 h; acidification at 0.degree.

RX(12) RCT W 398453-59-3

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RGT AB 133745-75-2 (PhSO2)NF
PRO Z 398453-61-7
NTE deprotonation at -78.degree. to 0.degree. over 5 min; fluorination at room temp. for 2 h

RX(14) RCT Z 398453-61-7

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RCT AD 117252-07-0
PRO AE 398464-67-0, AF 398464-69-2, AG 398464-70-5, AH 398464-71-6
NTE deprotonation at -78.degree. for 15 min; addn. reaction at -78.degree. for 2 h

RX(31) RCT AF 398464-69-2, AG 398464-70-5, BG 108-24-7
PRO AR 398453-67-3, BC 398453-80-0
CAT 1122-58-3 4-DMAP
SOL 75-09-2 CH2Cl2
NTE acetylation at room temp. for 2 h

RX(25) RCT BC 398453-80-0

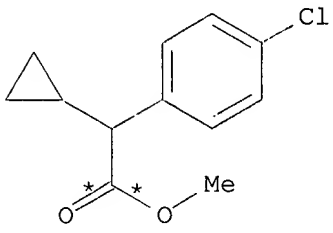
STAGE(1)
RGT T 1310-73-2 NaOH
SOL 67-56-1 MeOH, 7732-18-5 Water

STAGE(2)
RGT U 7647-01-0 HCl
SOL 141-78-6 AcOEt
PRO BD 398453-84-4
NTE sapon. under reflux for 1 h; acidification with concd. HCl

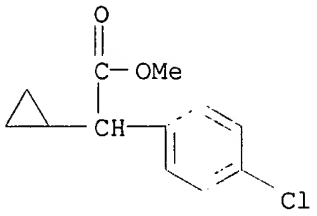
RX(29) RCT BD 398453-84-4
RGT J 98-59-9 TsCl
PRO BF **398453-75-3**
SOL 29611-84-5 Collidine
NTE decarboxylation and dehydration (olefination) at 170.degree. for 2 h

RX(351) OF 398 COMPOSED OF RX(3), RX(1), RX(4), RX(6), RX(9), RX(12), RX(14), RX(31), RX(18), RX(21)

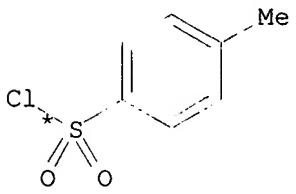
RX(351) 5 **G** + J + O + 4 V + 4 AD + 2 BG ===> **AV**



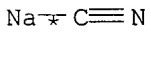
4 G



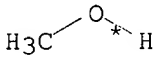
G



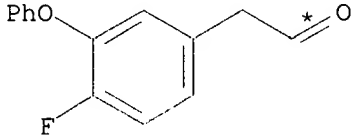
J



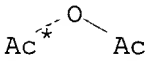
O



4 V

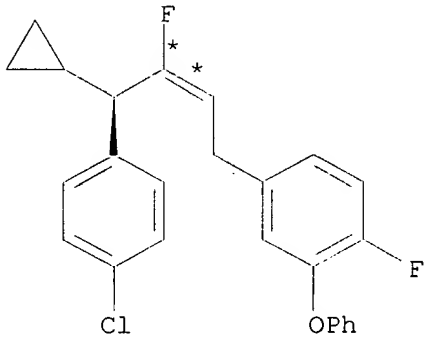


4 AD



2 BG

10 STEPS



AV

RX(3) RCT G **119544-56-8**
PRO A 398453-51-5, E 398453-52-6
CAT 9016-18-6 Carbonic esterase
SOL 7732-18-5 Water
NTE biotransformation; enzymic stereoselective hydrolysis at room temp. and pH 7.1-8.0

RX(1) RCT A 398453-51-5
RGT C 14044-65-6 BH3-THF
PRO B 119544-59-1
SOL 109-99-9 THF
NTE redn. at room temp. for 4 h

RX(4) RCT B 119544-59-1, J 98-59-9
RGT L 121-44-8 Et3N
PRO K 398453-53-7
SOL 75-09-2 CH2Cl2

NTE tosylation at room temp. for 3 days

RX(6) RCT K 398453-53-7, O 143-33-9
PRO P 398453-55-9
SOL 67-68-5 DMSO
NTE cyanation at 90.degree. for 3 h

RX(9) RCT P 398453-55-9, V 67-56-1
PRO W 398453-59-3
CAT 7647-01-0 HCl
NTE alkali hydrolysis under reflux for 18 h; acidification at 0.degree.

RX(12) RCT W 398453-59-3

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RGT AB 133745-75-2 (PhSO2)NF
PRO Z 398453-61-7
NTE deprotonation at -78.degree. to 0.degree. over 5 min; fluorination at room temp. for 2 h

RX(14) RCT Z 398453-61-7

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RCT AD 117252-07-0
PRO AE 398464-67-0, AF 398464-69-2, AG 398464-70-5, AH 398464-71-6
NTE deprotonation at -78.degree. for 15 min; addn. reaction at -78.degree. for 2 h

RX(31) RCT AF 398464-69-2, AG 398464-70-5, BG 108-24-7
PRO AR 398453-67-3, BC 398453-80-0
CAT 1122-58-3 4-DMAP
SOL 75-09-2 CH2Cl2
NTE acetylation at room temp. for 2 h

RX(18) RCT AR 398453-67-3

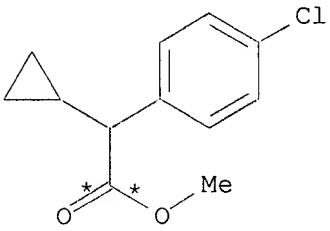
STAGE(1)
RGT T 1310-73-2 NaOH
SOL 67-56-1 MeOH, 7732-18-5 Water

STAGE(2)
RGT U 7647-01-0 HCl
SOL 141-78-6 AcOEt
PRO AS 398453-71-9
NTE sapon. under reflux for 1 h; acidification with concd. HCl

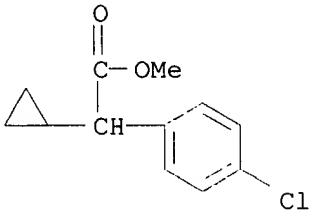
RX(21) RCT AS 398453-71-9
RGT J 98-59-9 TsCl
PRO AV **398453-74-2**
SOL 29611-84-5 Collidine
NTE decarboxylation and dehydration (olefination) at 170.degree. for 2 h

RX(352) OF 398 COMPOSED OF RX(3), RX(1), RX(4), RX(6), RX(9), RX(12), RX(14), RX(33), RX(18), RX(21)

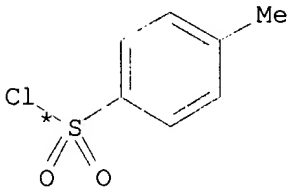
RX(352) 5 **G** + J + O + 4 V + 4 AD + 2 BG ===> **AV**



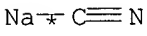
4 G



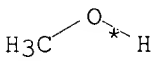
G



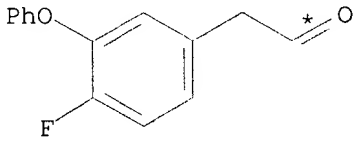
J



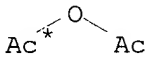
O



4 V

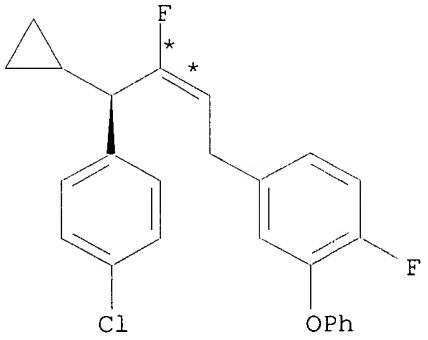


4 AD



2 BG

10 STEPS



AV

RX(3) RCT G **119544-56-8**
PRO A 398453-51-5, E 398453-52-6
CAT 9016-18-6 Carbonic esterase
SOL 7732-18-5 Water
NTE biotransformation; enzymic stereoselective hydrolysis at room temp. and pH 7.1-8.0

RX(1) RCT A 398453-51-5
RGT C 14044-65-6 BH3-THF
PRO B 119544-59-1
SOL 109-99-9 THF
NTE redn. at room temp. for 4 h

RX(4) RCT B 119544-59-1, J 98-59-9
RGT L 121-44-8 Et3N
PRO K 398453-53-7
SOL 75-09-2 CH2Cl2
NTE tosylation at room temp. for 3 days

RX(6) RCT K 398453-53-7, O 143-33-9
PRO P 398453-55-9
SOL 67-68-5 DMSO
NTE cyanation at 90.degree. for 3 h

RX(9) RCT P 398453-55-9, V 67-56-1
PRO W 398453-59-3
CAT 7647-01-0 HCl
NTE alkali hydrolysis under reflux for 18 h; acidification at 0.degree.

RX(12) RCT W 398453-59-3

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RGT AB 133745-75-2 (PhSO2)NF
PRO Z 398453-61-7
NTE deprotonation at -78.degree. to 0.degree. over 5 min; fluorination at room temp. for 2 h

RX(14) RCT Z 398453-61-7

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RCT AD 117252-07-0
PRO AE 398464-67-0, AF 398464-69-2, AG 398464-70-5, AH 398464-71-6
NTE deprotonation at -78.degree. for 15 min; addn. reaction at -78.degree. for 2 h

RX(33) RCT AH 398464-71-6, AF 398464-69-2, BG 108-24-7
PRO AR 398453-67-3, BA 398453-79-7
CAT 1122-58-3 4-DMAP
SOL 75-09-2 CH2Cl2
NTE acetylation at room temp. for 2 h

RX(18) RCT AR 398453-67-3

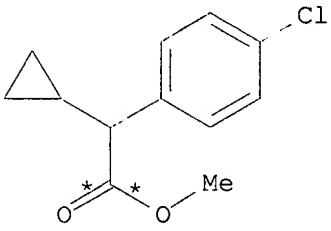
STAGE(1)
RGT T 1310-73-2 NaOH
SOL 67-56-1 MeOH, 7732-18-5 Water

STAGE(2)
RGT U 7647-01-0 HCl
SOL 141-78-6 AcOEt
PRO AS 398453-71-9
NTE sapon. under reflux for 1 h; acidification with concd. HCl

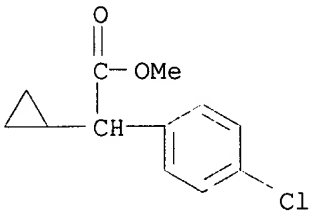
RX(21) RCT AS 398453-71-9
RGT J 98-59-9 TsCl
PRO AV **398453-74-2**

SOL 29611-84-5 Collidine
NTE decarboxylation and dehydration (olefination) at 170.degree. for 2 h

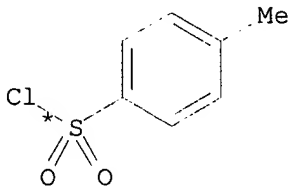
RX(353) OF 398 COMPOSED OF RX(3), RX(1), RX(4), RX(6), RX(9), RX(12), RX(14), RX(32), RX(24), RX(28)
RX(353) 5 **G** + J + O + 4 V + 4 AD + 2 BG ===> **BF**



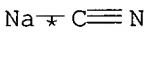
4 G



G



J



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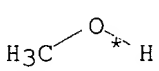
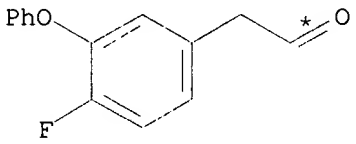
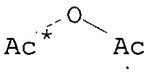


4 V

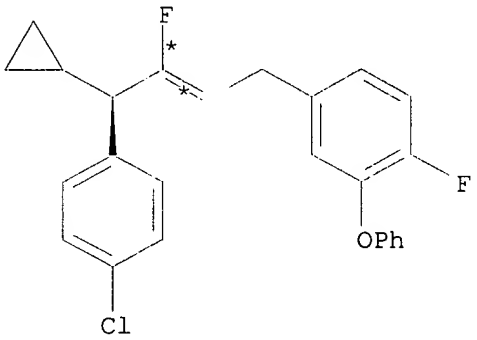


4 AD



2 BG

10 STEPS



BF

RX(3) RCT G **119544-56-8**
PRO A 398453-51-5, E 398453-52-6
CAT 9016-18-6 Carbonic esterase
SOL 7732-18-5 Water
NTE biotransformation; enzymic stereoselective hydrolysis at room temp. and pH 7.1-8.0

RX(1) RCT A 398453-51-5
RGT C 14044-65-6 BH3-THF
PRO B 119544-59-1
SOL 109-99-9 THF
NTE redn. at room temp. for 4 h

RX(4) RCT B 119544-59-1, J 98-59-9
RGT L 121-44-8 Et3N
PRO K 398453-53-7
SOL 75-09-2 CH2Cl2
NTE tosylation at room temp. for 3 days

RX(6) RCT K 398453-53-7, O 143-33-9
PRO P 398453-55-9
SOL 67-68-5 DMSO
NTE cyanation at 90.degree. for 3 h

RX(9) RCT P 398453-55-9, V 67-56-1
PRO W 398453-59-3
CAT 7647-01-0 HCl
NTE alkali hydrolysis under reflux for 18 h; acidification at 0.degree.

RX(12) RCT W 398453-59-3

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RGT AB 133745-75-2 (PhSO2)NF
PRO Z 398453-61-7
NTE deprotonation at -78.degree. to 0.degree. over 5 min; fluorination at room temp. for 2 h

RX(14) RCT Z 398453-61-7

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RCT AD 117252-07-0
PRO AE 398464-67-0, AF 398464-69-2, AG 398464-70-5, AH 398464-71-6
NTE deprotonation at -78.degree. for 15 min; addn. reaction at -78.degree. for 2 h

RX(32) RCT AH 398464-71-6, AE 398464-67-0, BG 108-24-7
PRO BH 398453-68-4, BA 398453-79-7
CAT 1122-58-3 4-DMAP
SOL 75-09-2 CH2Cl2
NTE acetylation at room temp. for 2 h

RX(24) RCT BA 398453-79-7

STAGE(1)
RGT T 1310-73-2 NaOH
SOL 67-56-1 MeOH, 7732-18-5 Water

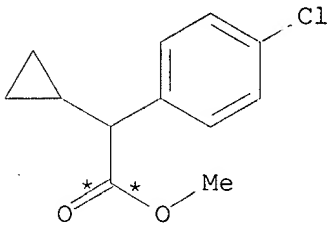
STAGE(2)
RGT U 7647-01-0 HCl
SOL 141-78-6 AcOEt
PRO BB 398453-76-4
NTE sapon. under reflux for 1 h; acidification with concd. HCl

RX(28) RCT BB 398453-76-4
RGT J 98-59-9 TsCl
PRO BF **398453-75-3**
SOL 29611-84-5 Collidine

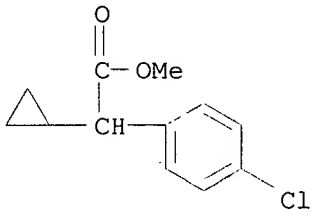
NTE decarboxylation and dehydration (olefination) at 170.degree. for 2 h

RX(354) OF 398 COMPOSED OF RX(3), RX(1), RX(4), RX(6), RX(9), RX(12), RX(14), RX(33), RX(24), RX(28)

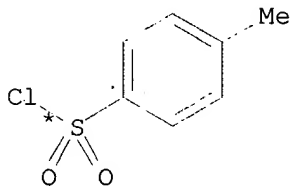
RX(354) 5 **G** + J + O + 4 V + 4 AD + 2 BG ===> **BF**



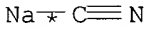
4 G



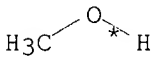
G



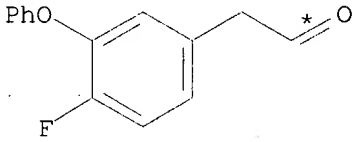
J



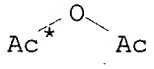
O



4 V

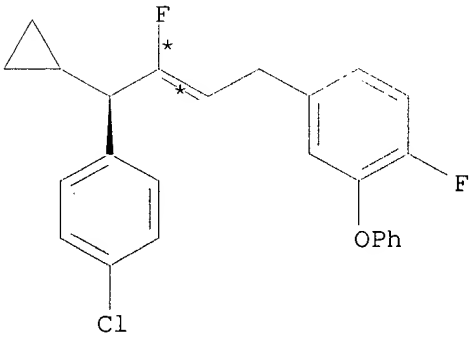


4 AD



2 BG

10 STEPS



BF

RX(3) RCT G **119544-56-8**
PRO A 398453-51-5, E 398453-52-6
CAT 9016-18-6 Carbonic esterase
SOL 7732-18-5 Water
NTE biotransformation; enzymic stereoselective hydrolysis at room temp. and pH 7.1-8.0

RX(1) RCT A 398453-51-5

RGT C 14044-65-6 BH3-THF
PRO B 119544-59-1
SOL 109-99-9 THF
NTE redn. at room temp. for 4 h

RX(4) RCT B 119544-59-1, J 98-59-9
RGT L 121-44-8 Et3N
PRO K 398453-53-7
SOL 75-09-2 CH2Cl2
NTE tosylation at room temp. for 3 days

RX(6) RCT K 398453-53-7, O 143-33-9
PRO P 398453-55-9
SOL 67-68-5 DMSO
NTE cyanation at 90.degree. for 3 h

RX(9) RCT P 398453-55-9, V 67-56-1
PRO W 398453-59-3
CAT 7647-01-0 HCl
NTE alkali hydrolysis under reflux for 18 h; acidification at 0.degree.

RX(12) RCT W 398453-59-3

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RGT AB 133745-75-2 (PhSO2)NF
PRO Z 398453-61-7
NTE deprotonation at -78.degree. to 0.degree. over 5 min; fluorination at room temp. for 2 h

RX(14) RCT Z 398453-61-7

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RCT AD 117252-07-0
PRO AE 398464-67-0, AF 398464-69-2, AG 398464-70-5, AH 398464-71-6
NTE deprotonation at -78.degree. for 15 min; addn. reaction at -78.degree. for 2 h

RX(33) RCT AH 398464-71-6, AF 398464-69-2, BG 108-24-7
PRO AR 398453-67-3, BA 398453-79-7
CAT 1122-58-3 4-DMAP
SOL 75-09-2 CH2Cl2
NTE acetylation at room temp. for 2 h

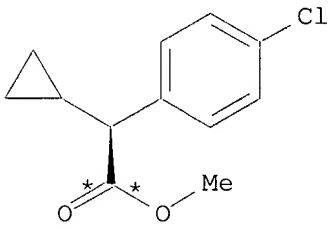
RX(24) RCT BA 398453-79-7

STAGE(1)
RGT T 1310-73-2 NaOH
SOL 67-56-1 MeOH, 7732-18-5 Water

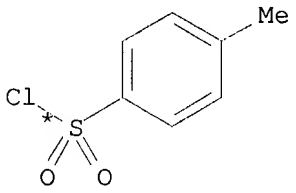
STAGE(2)
RGT U 7647-01-0 HCl
SOL 141-78-6 AcOEt
PRO BB 398453-76-4
NTE sapon. under reflux for 1 h; acidification with concd. HCl

RX(28) RCT BB 398453-76-4
RGT J 98-59-9 TsCl
PRO BF **398453-75-3**
SOL 29611-84-5 Collidine
NTE decarboxylation and dehydration (olefination) at 170.degree. for 2 h

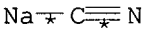
RX(383) OF 398 COMPOSED OF RX(2), RX(5), RX(7), RX(10), RX(11), RX(13), RX(15), RX(34), RX(17), RX(19)
RX(383) 4 **E** + 4 J + 4 O + 4 V + 4 AD + 2 BG ===>
AT



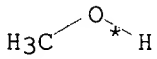
4 E



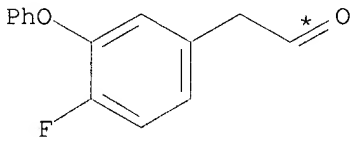
4 J



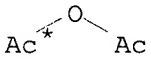
4 O



4 V

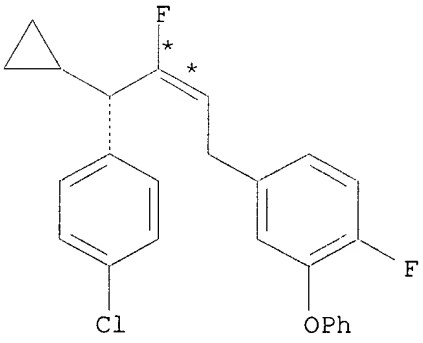


4 AD



2 BG

10 STEPS



AT

RX(2) RCT E **398453-52-6**
RGT C 14044-65-6 BH3-THF
PRO F 119544-60-4
SOL 109-99-9 THF
NTE redn. at room temp. for 4 h

RX(5) RCT F 119544-60-4, J 98-59-9
RGT L 121-44-8 Et3N

PRO N 398453-54-8
SOL 75-09-2 CH2Cl2
NTE tosylation at room temp. for 3 days

RX(7) RCT N 398453-54-8, O 143-33-9
PRO R 398453-56-0
SOL 67-68-5 DMSO
NTE cyanation at 90.degree. for 3 h

RX(10) RCT R 398453-56-0

STAGE(1)
RGT T 1310-73-2 NaOH
SOL 7732-18-5 Water, 67-56-1 MeOH

STAGE(2)
RGT U 7647-01-0 HCl
SOL 7732-18-5 Water
PRO X 398453-58-2
NTE alkali hydrolysis under reflux for 18 h; acidification at 0.degree.

RX(11) RCT X 398453-58-2, V 67-56-1
PRO Y 398453-60-6
CAT 7647-01-0 HCl
NTE esterification at room temp. for 18 h

RX(13) RCT Y 398453-60-6

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RGT AB 133745-75-2 (PhSO2)NF
PRO AC 398453-62-8
NTE deprotonation at -78.degree. to 0.degree. over 5 min; fluorination at room temp. for 2 h

RX(15) RCT AC 398453-62-8

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RCT AD 117252-07-0
PRO AI 398464-73-8, AJ 398464-74-9, AK 398464-75-0, AL 398464-76-1
NTE deprotonation at -78.degree. for 15 min; addn. reaction at -78.degree. for 2 h; 50% overall yield

RX(34) RCT AI 398464-73-8, AL 398464-76-1, BG 108-24-7
PRO AP 398453-64-0, AW 398453-77-5
CAT 1122-58-3 4-DMAP
SOL 75-09-2 CH2Cl2
NTE acetylation at room temp. for 2 h

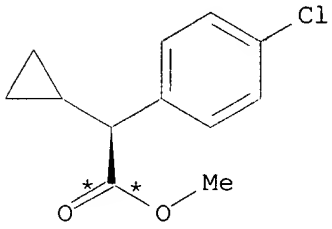
RX(17) RCT AP 398453-64-0

STAGE(1)
RGT T 1310-73-2 NaOH
SOL 67-56-1 MeOH, 7732-18-5 Water

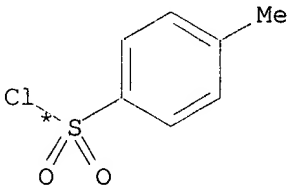
STAGE(2)
RGT U 7647-01-0 HCl
SOL 141-78-6 AcOEt
PRO AQ 398453-69-5
NTE sapon. under reflux for 1 h; acidification with concd. HCl

RX(19) RCT AQ 398453-69-5
RGT J 98-59-9 TsCl
PRO AT **398453-73-1**
SOL 29611-84-5 Collidine
NTE decarboxylation and dehydration (olefination) at 170.degree. for 2 h

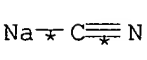
RX(384) OF 398 COMPOSED OF RX(2), RX(5), RX(7), RX(10), RX(11), RX(13), RX(15), RX(35), RX(17), RX(19)
RX(384) 4 **E** + 4 J + 4 O + 4 V + 4 AD + 2 BG ===>
AT



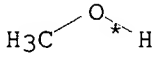
4 E



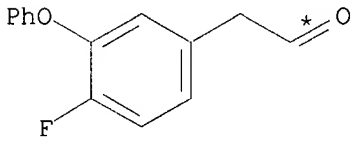
4 J



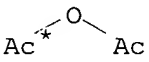
4 O



4 V

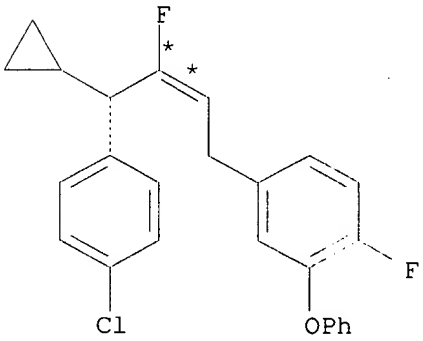


4 AD



2 BG

10 STEPS



AT

RX(2) RCT E **398453-52-6**
RGT C 14044-65-6 BH3-THF

PRO F 119544-60-4
SOL 109-99-9 THF
NTE redn. at room temp. for 4 h

RX(5) RCT F 119544-60-4, J 98-59-9
RGT L 121-44-8 Et3N
PRO N 398453-54-8
SOL 75-09-2 CH2Cl2
NTE tosylation at room temp. for 3 days

RX(7) RCT N 398453-54-8, O 143-33-9
PRO R 398453-56-0
SOL 67-68-5 DMSO
NTE cyanation at 90.degree. for 3 h

RX(10) RCT R 398453-56-0

STAGE(1)
RGT T 1310-73-2 NaOH
SOL 7732-18-5 Water, 67-56-1 MeOH

STAGE(2)
RGT U 7647-01-0 HCl
SOL 7732-18-5 Water
PRO X 398453-58-2
NTE alkali hydrolysis under reflux for 18 h; acidification at 0.degree.

RX(11) RCT X 398453-58-2, V 67-56-1
PRO Y 398453-60-6
CAT 7647-01-0 HCl
NTE esterification at room temp. for 18 h

RX(13) RCT Y 398453-60-6

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RGT AB 133745-75-2 (PhSO2)NF
PRO AC 398453-62-8
NTE deprotonation at -78.degree. to 0.degree. over 5 min; fluorination at room temp. for 2 h

RX(15) RCT AC 398453-62-8

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RCT AD 117252-07-0
PRO AI 398464-73-8, AJ 398464-74-9, AK 398464-75-0, AL 398464-76-1
NTE deprotonation at -78.degree. for 15 min; addn. reaction at -78.degree. for 2 h; 50% overall yield

RX(35) RCT AI 398464-73-8, AK 398464-75-0, BG 108-24-7
PRO AP 398453-64-0, AY 398453-78-6
CAT 1122-58-3 4-DMAP
SOL 75-09-2 CH2Cl2
NTE acetylation at room temp. for 2 h

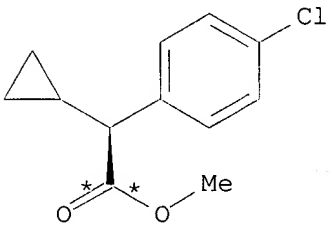
RX(17) RCT AP 398453-64-0

STAGE(1)
RGT T 1310-73-2 NaOH
SOL 67-56-1 MeOH, 7732-18-5 Water

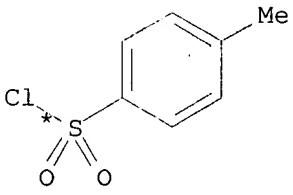
STAGE(2)
RGT U 7647-01-0 HCl
SOL 141-78-6 AcOEt
PRO AQ 398453-69-5
NTE sapon. under reflux for 1 h; acidification with concd. HCl

RX(19) RCT AQ 398453-69-5
RGT J 98-59-9 TsCl
PRO AT **398453-73-1**
SOL 29611-84-5 Collidine
NTE decarboxylation and dehydration (olefination) at 170.degree. for 2 h

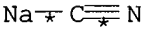
RX(385) OF 398 COMPOSED OF RX(2), RX(5), RX(7), RX(10), RX(11), RX(13), RX(15), RX(34), RX(22), RX(26)
RX(385) 4 **E** + 4 J + 4 O + 4 V + 4 AD + 2 BG ===>
BE



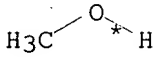
4 E



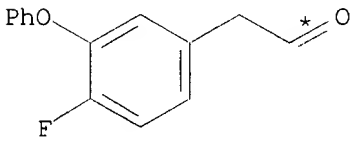
4 J



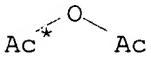
4 O



4 V

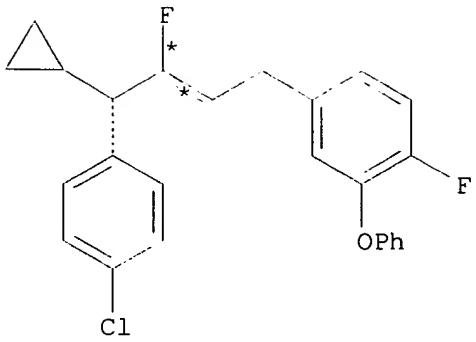


4 AD



2 BG

10
STEPS



BE
YIELD 69%

RX(2) RCT E **398453-52-6**
RGT C 14044-65-6 BH3-THF
PRO F 119544-60-4
SOL 109-99-9 THF
NTE redn. at room temp. for 4 h

RX(5) RCT F 119544-60-4, J 98-59-9
RGT L 121-44-8 Et3N
PRO N 398453-54-8
SOL 75-09-2 CH2Cl2
NTE tosylation at room temp. for 3 days

RX(7) RCT N 398453-54-8, O 143-33-9
PRO R 398453-56-0
SOL 67-68-5 DMSO
NTE cyanation at 90.degree. for 3 h

RX(10) RCT R 398453-56-0

STAGE(1)
RGT T 1310-73-2 NaOH
SOL 7732-18-5 Water, 67-56-1 MeOH

STAGE(2)
RGT U 7647-01-0 HCl
SOL 7732-18-5 Water
PRO X 398453-58-2
NTE alkali hydrolysis under reflux for 18 h; acidification at 0.degree.

RX(11) RCT X 398453-58-2, V 67-56-1
PRO Y 398453-60-6
CAT 7647-01-0 HCl
NTE esterification at room temp. for 18 h

RX(13) RCT Y 398453-60-6

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RGT AB 133745-75-2 (PhSO2)NF
PRO AC 398453-62-8

NTE deprotonation at -78.degree. to 0.degree. over 5 min; fluorination at room temp. for 2 h

RX(15) RCT AC 398453-62-8

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RCT AD 117252-07-0
PRO AI 398464-73-8, AJ 398464-74-9, AK 398464-75-0, AL 398464-76-1
NTE deprotonation at -78.degree. for 15 min; addn. reaction at -78.degree. for 2 h; 50% overall yield

RX(34) RCT AI 398464-73-8, AL 398464-76-1, BG 108-24-7
PRO AP 398453-64-0, AW 398453-77-5
CAT 1122-58-3 4-DMAP
SOL 75-09-2 CH2Cl2
NTE acetylation at room temp. for 2 h

RX(22) RCT AW 398453-77-5

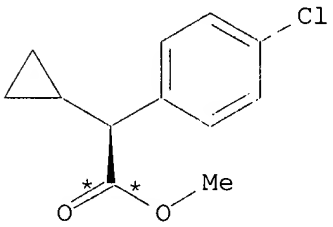
STAGE(1)
RGT T 1310-73-2 NaOH
SOL 67-56-1 MeOH, 7732-18-5 Water

STAGE(2)
RGT U 7647-01-0 HCl
SOL 141-78-6 AcOEt
PRO AX 398453-81-1
NTE sapon. under reflux for 1 h; acidification with concd. HCl

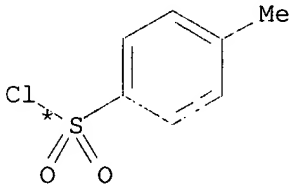
RX(26) RCT AX 398453-81-1
RGT J 98-59-9 TsCl
PRO BE **398453-72-0**
SOL 29611-84-5 Collidine
NTE decarboxylation and dehydration (olefination) at 170.degree. for 2 h

RX(386) OF 398 COMPOSED OF RX(2), RX(5), RX(7), RX(10), RX(11), RX(13), RX(15), RX(36), RX(22), RX(26)

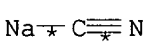
RX(386) 4 **E** + 4 J + 4 O + 4 V + 4 AD + 2 BG ===> **BE**



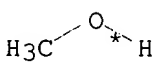
4 E



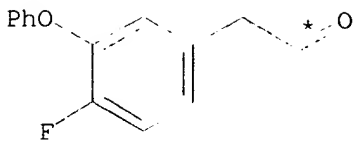
4 J



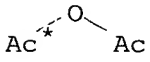
4 O



4 V

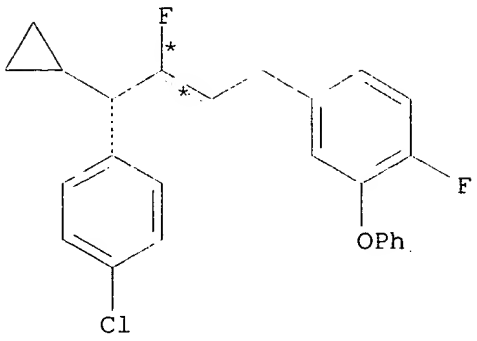


4 AD



2 BG

10 STEPS



BE
YIELD 69%

RX(2) RCT E **398453-52-6**
RGT C 14044-65-6 BH3-THF
PRO F 119544-60-4
SOL 109-99-9 THF
NTE redn. at room temp. for 4 h

RX(5) RCT F 119544-60-4, J 98-59-9
RGT L 121-44-8 Et3N
PRO N 398453-54-8
SOL 75-09-2 CH2Cl2
NTE tosylation at room temp. for 3 days

RX(7) RCT N 398453-54-8, O 143-33-9
PRO R 398453-56-0
SOL 67-68-5 DMSO
NTE cyanation at 90.degree. for 3 h

RX(10) RCT R 398453-56-0

STAGE(1)
RGT T 1310-73-2 NaOH
SOL 7732-18-5 Water, 67-56-1 MeOH

STAGE(2)
RGT U 7647-01-0 HCl
SOL 7732-18-5 Water
PRO X 398453-58-2
NTE alkali hydrolysis under reflux for 18 h; acidification at 0.degree.

RX(11) RCT X 398453-58-2, V 67-56-1
PRO Y 398453-60-6
CAT 7647-01-0 HCl

NTE esterification at room temp. for 18 h

RX(13) RCT Y 398453-60-6

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RGT AB 133745-75-2 (PhSO2)NF
PRO AC 398453-62-8
NTE deprotonation at -78.degree. to 0.degree. over 5 min; fluorination at room temp. for 2 h

RX(15) RCT AC 398453-62-8

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RCT AD 117252-07-0
PRO AI 398464-73-8, AJ 398464-74-9, AK 398464-75-0, AL 398464-76-1
NTE deprotonation at -78.degree. for 15 min; addn. reaction at -78.degree. for 2 h; 50% overall yield

RX(36) RCT AJ 398464-74-9, AL 398464-76-1, BG 108-24-7
PRO AM 398453-63-9, AW 398453-77-5
CAT 1122-58-3 4-DMAP
SOL 75-09-2 CH2Cl2
NTE acetylation at room temp. for 2 h in 79% overall yield

RX(22) RCT AW 398453-77-5

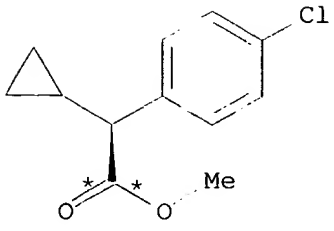
STAGE(1)
RGT T 1310-73-2 NaOH
SOL 67-56-1 MeOH, 7732-18-5 Water

STAGE(2)
RGT U 7647-01-0 HCl
SOL 141-78-6 AcOEt
PRO AX 398453-81-1
NTE sapon. under reflux for 1 h; acidification with concd. HCl

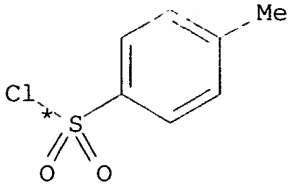
RX(26) RCT AX 398453-81-1
RGT J 98-59-9 TsCl
PRO BE **398453-72-0**
SOL 29611-84-5 Collidine
NTE decarboxylation and dehydration (olefination) at 170.degree. for 2 h

RX(387) OF 398 COMPOSED OF RX(2), RX(5), RX(7), RX(10), RX(11), RX(13), RX(15), RX(35), RX(23), RX(27)

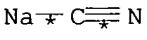
RX(387) 4 **E** + 4 J + 4 O + 4 V + 4 AD + 2 BG ===> **BE**



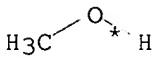
4 E



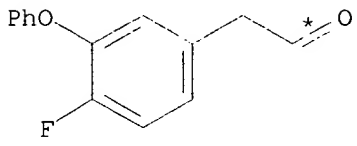
4 J



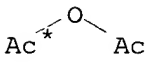
4 O



4 V

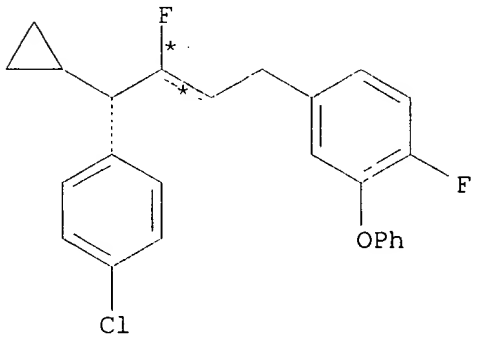


4 AD



2 BG

10 STEPS



BE
YIELD 69%

RX(2) RCT E **398453-52-6**
RGT C 14044-65-6 BH3-THF
PRO F 119544-60-4
SOL 109-99-9 THF
NTE redn. at room temp. for 4 h

RX(5) RCT F 119544-60-4, J 98-59-9
RGT L 121-44-8 Et3N
PRO N 398453-54-8
SOL 75-09-2 CH2Cl2
NTE tosylation at room temp. for 3 days

RX(7) RCT N 398453-54-8, O 143-33-9
PRO R 398453-56-0
SOL 67-68-5 DMSO
NTE cyanation at 90.degree. for 3 h

RX(10) RCT R 398453-56-0

STAGE(1)
RGT T 1310-73-2 NaOH
SOL 7732-18-5 Water, 67-56-1 MeOH

STAGE(2)
RGT U 7647-01-0 HCl
SOL 7732-18-5 Water
PRO X 398453-58-2
NTE alkali hydrolysis under reflux for 18 h; acidification at 0.degree.

RX(11) RCT X 398453-58-2, V 67-56-1
PRO Y 398453-60-6
CAT 7647-01-0 HCl
NTE esterification at room temp. for 18 h

RX(13) RCT Y 398453-60-6

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RGT AB 133745-75-2 (PhSO2)NF
PRO AC 398453-62-8
NTE deprotonation at -78.degree. to 0.degree. over 5 min; fluorination at room temp. for 2 h

RX(15) RCT AC 398453-62-8

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RCT AD 117252-07-0
PRO AI 398464-73-8, AJ 398464-74-9, AK 398464-75-0, AL 398464-76-1
NTE deprotonation at -78.degree. for 15 min; addn. reaction at -78.degree. for 2 h; 50% overall yield

RX(35) RCT AI 398464-73-8, AK 398464-75-0, BG 108-24-7
PRO AP 398453-64-0, AY 398453-78-6
CAT 1122-58-3 4-DMAP
SOL 75-09-2 CH2Cl2
NTE acetylation at room temp. for 2 h

RX(23) RCT AY 398453-78-6

STAGE(1)
RGT T 1310-73-2 NaOH
SOL 67-56-1 MeOH, 7732-18-5 Water

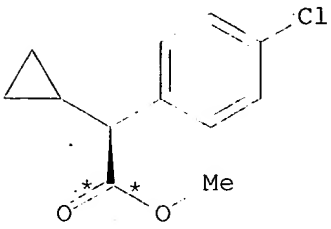
STAGE(2)
RGT U 7647-01-0 HCl
SOL 141-78-6 AcOEt
PRO AZ 398453-82-2
NTE sapon. under reflux for 1 h; acidification with concd. HCl

RX(27) RCT AZ 398453-82-2
RGT J 98-59-9 TsCl
PRO BE **398453-72-0**
SOL 29611-84-5 Collidine
NTE decarboxylation and dehydration (olefination) at 170.degree. for

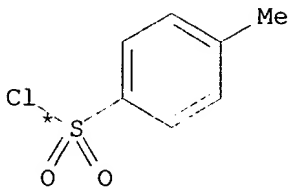
2 h

RX(388) OF 398 COMPOSED OF RX(2), RX(5), RX(7), RX(10), RX(11), RX(13), RX(15), RX(37), RX(23), RX(27)

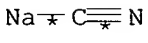
RX(388) 4 **E** + 4 J + 4 O + 4 V + 4 AD + 2 BG ===>
BE



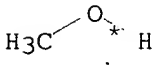
4 E



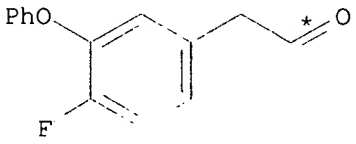
4 J



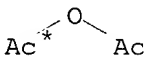
4 O



4 V

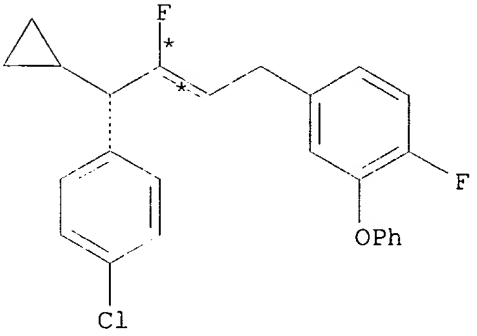


4 AD



2 BG

10 STEPS



BE
YIELD 69%

RX(2) RCT E **398453-52-6**
RGT C 14044-65-6 BH3-THF
PRO F 119544-60-4
SOL 109-99-9 THF
NTE redn. at room temp. for 4 h

RX(5) RCT F 119544-60-4, J 98-59-9
RGT L 121-44-8 Et3N
PRO N 398453-54-8
SOL 75-09-2 CH2Cl2
NTE tosylation at room temp. for 3 days

RX(7) RCT N 398453-54-8, O 143-33-9
PRO R 398453-56-0
SOL 67-68-5 DMSO
NTE cyanation at 90.degree. for 3 h

RX(10) RCT R 398453-56-0

STAGE(1)
RGT T 1310-73-2 NaOH
SOL 7732-18-5 Water, 67-56-1 MeOH

STAGE(2)
RGT U 7647-01-0 HCl
SOL 7732-18-5 Water
PRO X 398453-58-2
NTE alkali hydrolysis under reflux for 18 h; acidification at 0.degree.

RX(11) RCT X 398453-58-2, V 67-56-1
PRO Y 398453-60-6
CAT 7647-01-0 HCl
NTE esterification at room temp. for 18 h

RX(13) RCT Y 398453-60-6

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RGT AB 133745-75-2 (PhSO2)NF
PRO AC 398453-62-8
NTE deprotonation at -78.degree. to 0.degree. over 5 min; fluorination at room temp. for 2 h

RX(15) RCT AC 398453-62-8

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RCT AD 117252-07-0
PRO AI 398464-73-8, AJ 398464-74-9, AK 398464-75-0, AL 398464-76-1
NTE deprotonation at -78.degree. for 15 min; addn. reaction at -78.degree. for 2 h; 50% overall yield

RX(37) RCT AK 398464-75-0, AJ 398464-74-9, BG 108-24-7
PRO AM 398453-63-9, AY 398453-78-6
CAT 1122-58-3 4-DMAP
SOL 75-09-2 CH2Cl2
NTE acetylation at room temp. for 2 h

RX(23) RCT AY 398453-78-6

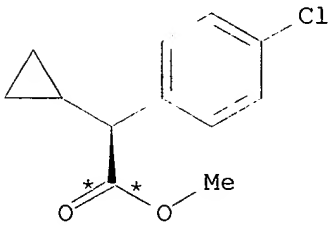
STAGE(1)
RGT T 1310-73-2 NaOH
SOL 67-56-1 MeOH, 7732-18-5 Water

STAGE(2)
RGT U 7647-01-0 HCl
SOL 141-78-6 AcOEt
PRO AZ 398453-82-2

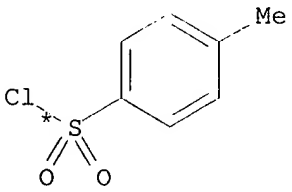
NTE sapon. under reflux for 1 h; acidification with concd. HCl

RX(27) RCT AZ 398453-82-2
RGT J 98-59-9 TsCl
PRO BE **398453-72-0**
SOL 29611-84-5 Collidine
NTE decarboxylation and dehydration (olefination) at 170.degree. for 2 h

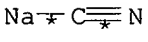
RX(389) OF 398 COMPOSED OF RX(2), RX(5), RX(7), RX(10), RX(11), RX(13), RX(15), RX(36), RX(16), RX(20)
RX(389) 4 **E** + 4 J + 4 O + 4 V + 4 AD + 2 BG ===>
AT



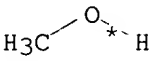
4 E



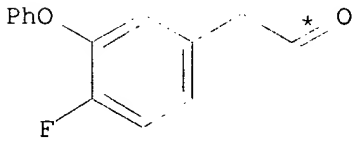
4 J



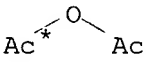
4 O



4 V

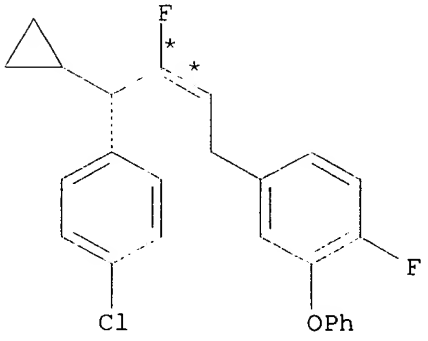


4 AD



2 BG

10 STEPS



AT

RX(2) RCT E **398453-52-6**
RGT C 14044-65-6 BH3-THF
PRO F 119544-60-4
SOL 109-99-9 THF
NTE redn. at room temp. for 4 h

RX(5) RCT F 119544-60-4, J 98-59-9
RGT L 121-44-8 Et3N
PRO N 398453-54-8
SOL 75-09-2 CH2Cl2
NTE tosylation at room temp. for 3 days

RX(7) RCT N 398453-54-8, O 143-33-9
PRO R 398453-56-0
SOL 67-68-5 DMSO
NTE cyanation at 90.degree. for 3 h

RX(10) RCT R 398453-56-0

STAGE(1)
RGT T 1310-73-2 NaOH
SOL 7732-18-5 Water, 67-56-1 MeOH

STAGE(2)
RGT U 7647-01-0 HCl
SOL 7732-18-5 Water
PRO X 398453-58-2
NTE alkali hydrolysis under reflux for 18 h; acidification at 0.degree.

RX(11) RCT X 398453-58-2, V 67-56-1
PRO Y 398453-60-6
CAT 7647-01-0 HCl
NTE esterification at room temp. for 18 h

RX(13) RCT Y 398453-60-6

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RGT AB 133745-75-2 (PhSO2)NF
PRO AC 398453-62-8
NTE deprotonation at -78.degree. to 0.degree. over 5 min; fluorination at room temp. for 2 h

RX(15) RCT AC 398453-62-8

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RCT AD 117252-07-0
PRO AI 398464-73-8, AJ 398464-74-9, AK 398464-75-0, AL 398464-76-1
NTE deprotonation at -78.degree. for 15 min; addn. reaction at -78.degree. for 2 h; 50% overall yield

RX(36) RCT AJ 398464-74-9, AL 398464-76-1, BG 108-24-7
PRO AM 398453-63-9, AW 398453-77-5
CAT 1122-58-3 4-DMAP
SOL 75-09-2 CH2Cl2
NTE acetylation at room temp. for 2 h in 79% overall yield

RX(16) RCT AM 398453-63-9

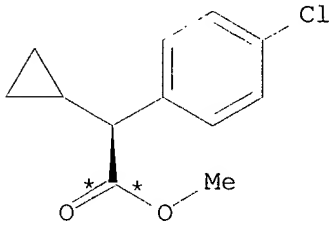
STAGE(1)
RGT T 1310-73-2 NaOH

SOL 67-56-1 MeOH, 7732-18-5 Water

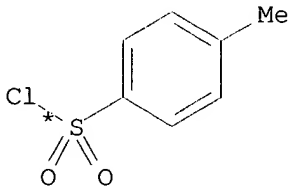
STAGE(2)
RGT U 7647-01-0 HCl
SOL 141-78-6 AcOEt
PRO AN 398453-70-8
NTE sapon. under reflux for 1 h; acidification with concd. HCl

RX(20) RCT AN 398453-70-8
RGT J 98-59-9 TsCl
PRO AT **398453-73-1**
SOL 29611-84-5 Collidine
NTE decarboxylation and dehydration (olefination) at 170.degree. for 2 h

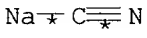
RX(390) OF 398 COMPOSED OF RX(2), RX(5), RX(7), RX(10), RX(11), RX(13), RX(15), RX(37), RX(16), RX(20)
RX(390) 4 **E** + 4 J + 4 O + 4 V + 4 AD + 2 BG ===>
AT



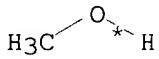
4 E



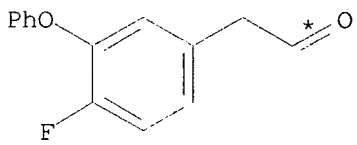
4 J



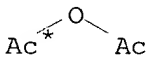
4 O



4 V

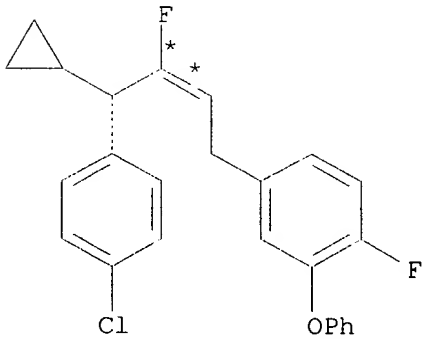


4 AD



2 BG

10 STEPS →



AT

RX(2) RCT E **398453-52-6**
RGT C 14044-65-6 BH3-THF
PRO F 119544-60-4
SOL 109-99-9 THF
NTE redn. at room temp. for 4 h

RX(5) RCT F 119544-60-4, J 98-59-9
RGT L 121-44-8 Et3N
PRO N 398453-54-8
SOL 75-09-2 CH2Cl2
NTE tosylation at room temp. for 3 days

RX(7) RCT N 398453-54-8, O 143-33-9
PRO R 398453-56-0
SOL 67-68-5 DMSO
NTE cyanation at 90.degree. for 3 h

RX(10) RCT R 398453-56-0

STAGE(1)
RGT T 1310-73-2 NaOH
SOL 7732-18-5 Water, 67-56-1 MeOH

STAGE(2)
RGT U 7647-01-0 HCl
SOL 7732-18-5 Water
PRO X 398453-58-2
NTE alkali hydrolysis under reflux for 18 h; acidification at 0.degree.

RX(11) RCT X 398453-58-2, V 67-56-1
PRO Y 398453-60-6
CAT 7647-01-0 HCl
NTE esterification at room temp. for 18 h

RX(13) RCT Y 398453-60-6

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RGT AB 133745-75-2 (PhSO2)NF
PRO AC 398453-62-8
NTE deprotonation at -78.degree. to 0.degree. over 5 min; fluorination at room temp. for 2 h

RX(15) RCT AC 398453-62-8

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RCT AD 117252-07-0
PRO AI 398464-73-8, AJ 398464-74-9, AK 398464-75-0, AL 398464-76-1
NTE deprotonation at -78.degree. for 15 min; addn. reaction at -78.degree. for 2 h; 50% overall yield

RX(37) RCT AK 398464-75-0, AJ 398464-74-9, BG 108-24-7
PRO AM 398453-63-9, AY 398453-78-6
CAT 1122-58-3 4-DMAP
SOL 75-09-2 CH2Cl2

NTE acetylation at room temp. for 2 h

RX(16) RCT AM 398453-63-9

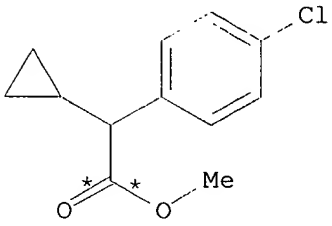
STAGE(1)
RGT T 1310-73-2 NaOH
SOL 67-56-1 MeOH, 7732-18-5 Water

STAGE(2)
RGT U 7647-01-0 HCl
SOL 141-78-6 AcOEt
PRO AN 398453-70-8
NTE sapon. under reflux for 1 h; acidification with concd. HCl

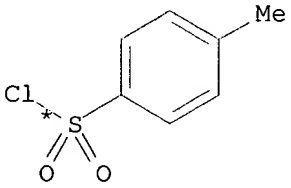
RX(20) RCT AN 398453-70-8
RGT J 98-59-9 TsCl
PRO AT **398453-73-1**
SOL 29611-84-5 Collidine
NTE decarboxylation and dehydration (olefination) at 170.degree. for 2 h

RX(391) OF 398 COMPOSED OF RX(3), RX(2), RX(5), RX(7), RX(10), RX(11), RX(13), RX(15), RX(34), RX(17), RX(19)

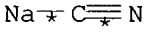
RX(391) 5 **G** + 4 J + 4 O + 4 V + 4 AD + 2 BG ===> **AT**



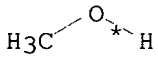
5 G



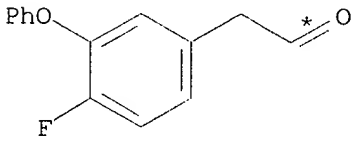
4 J



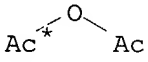
4 O



4 V

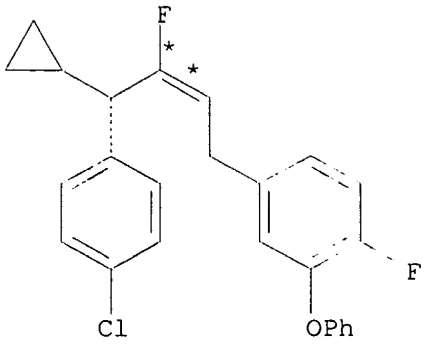


4 AD



2 BG

11 STEPS ⟶



AT

RX(3) RCT G **119544-56-8**
PRO A 398453-51-5, E 398453-52-6
CAT 9016-18-6 Carbonic esterase
SOL 7732-18-5 Water
NTE biotransformation; enzymic stereoselective hydrolysis at room temp. and pH 7.1-8.0

RX(2) RCT E 398453-52-6
RGT C 14044-65-6 BH3-THF
PRO F 119544-60-4
SOL 109-99-9 THF
NTE redn. at room temp. for 4 h

RX(5) RCT F 119544-60-4, J 98-59-9
RGT L 121-44-8 Et3N
PRO N 398453-54-8
SOL 75-09-2 CH2Cl2
NTE tosylation at room temp. for 3 days

RX(7) RCT N 398453-54-8, O 143-33-9
PRO R 398453-56-0
SOL 67-68-5 DMSO
NTE cyanation at 90.degree. for 3 h

RX(10) RCT R 398453-56-0

STAGE(1)
RGT T 1310-73-2 NaOH
SOL 7732-18-5 Water, 67-56-1 MeOH

STAGE(2)
RGT U 7647-01-0 HCl
SOL 7732-18-5 Water
PRO X 398453-58-2
NTE alkali hydrolysis under reflux for 18 h; acidification at 0.degree.

RX(11) RCT X 398453-58-2, V 67-56-1
PRO Y 398453-60-6
CAT 7647-01-0 HCl
NTE esterification at room temp. for 18 h

RX(13) RCT Y 398453-60-6

STAGE(1)

RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RGT AB 133745-75-2 (PhSO2)NF
PRO AC 398453-62-8
NTE deprotonation at -78.degree. to 0.degree. over 5 min; fluorination at room temp. for 2 h

RX(15) RCT AC 398453-62-8

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RCT AD 117252-07-0
PRO AI 398464-73-8, AJ 398464-74-9, AK 398464-75-0, AL 398464-76-1
NTE deprotonation at -78.degree. for 15 min; addn. reaction at -78.degree. for 2 h; 50% overall yield

RX(34) RCT AI 398464-73-8, AL 398464-76-1, BG 108-24-7
PRO AP 398453-64-0, AW 398453-77-5
CAT 1122-58-3 4-DMAP
SOL 75-09-2 CH2Cl2
NTE acetylation at room temp. for 2 h

RX(17) RCT AP 398453-64-0

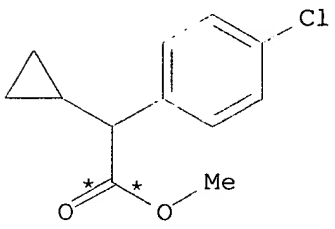
STAGE(1)
RGT T 1310-73-2 NaOH
SOL 67-56-1 MeOH, 7732-18-5 Water

STAGE(2)
RGT U 7647-01-0 HCl
SOL 141-78-6 AcOEt
PRO AQ 398453-69-5
NTE sapon. under reflux for 1 h; acidification with concd. HCl

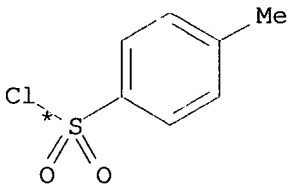
RX(19) RCT AQ 398453-69-5
RGT J 98-59-9 TsCl
PRO AT **398453-73-1**
SOL 29611-84-5 Collidine
NTE decarboxylation and dehydration (olefination) at 170.degree. for 2 h

RX(392) OF 398 COMPOSED OF RX(3), RX(2), RX(5), RX(7), RX(10), RX(11), RX(13), RX(15), RX(35), RX(17), RX(19)

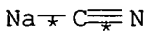
RX(392) 5 **G** + 4 J + 4 O + 4 V + 4 AD + 2 BG ===> **AT**



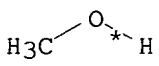
5 G



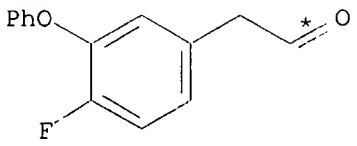
4 J



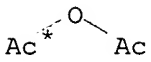
4 O



4 V

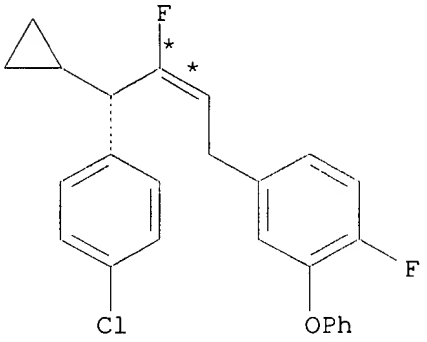


4 AD



2 BG

11 STEPS



AT

RX(3) RCT G **119544-56-8**
PRO A 398453-51-5, E 398453-52-6
CAT 9016-18-6 Carbonic esterase
SOL 7732-18-5 Water
NTE biotransformation; enzymic stereoselective hydrolysis at room temp. and pH 7.1-8.0

RX(2) RCT E 398453-52-6
RGT C 14044-65-6 BH3-THF
PRO F 119544-60-4
SOL 109-99-9 THF
NTE redn. at room temp. for 4 h

RX(5) RCT F 119544-60-4, J 98-59-9
RGT L 121-44-8 Et3N
PRO N 398453-54-8
SOL 75-09-2 CH2Cl2
NTE tosylation at room temp. for 3 days

RX(7) RCT N 398453-54-8, O 143-33-9
PRO R 398453-56-0
SOL 67-68-5 DMSO
NTE cyanation at 90.degree. for 3 h

RX(10) RCT R 398453-56-0

STAGE(1)
RGT T 1310-73-2 NaOH
SOL 7732-18-5 Water, 67-56-1 MeOH

STAGE(2)
RGT U 7647-01-0 HCl

SOL 7732-18-5 Water
PRO X 398453-58-2
NTE alkali hydrolysis under reflux for 18 h; acidification at 0.degree.

RX(11) RCT X 398453-58-2, V 67-56-1
PRO Y 398453-60-6
CAT 7647-01-0 HCl
NTE esterification at room temp. for 18 h

RX(13) RCT Y 398453-60-6

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RGT AB 133745-75-2 (PhSO2)NF
PRO AC 398453-62-8
NTE deprotonation at -78.degree. to 0.degree. over 5 min; fluorination at room temp. for 2 h

RX(15) RCT AC 398453-62-8

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RCT AD 117252-07-0
PRO AI 398464-73-8, AJ 398464-74-9, AK 398464-75-0, AL 398464-76-1
NTE deprotonation at -78.degree. for 15 min; addn. reaction at -78.degree. for 2 h; 50% overall yield

RX(35) RCT AI 398464-73-8, AK 398464-75-0, BG 108-24-7
PRO AP 398453-64-0, AY 398453-78-6
CAT 1122-58-3 4-DMAP
SOL 75-09-2 CH2Cl2
NTE acetylation at room temp. for 2 h

RX(17) RCT AP 398453-64-0

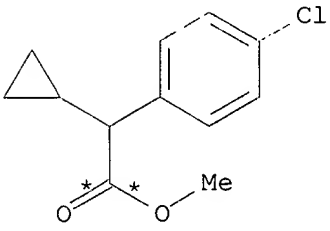
STAGE(1)
RGT T 1310-73-2 NaOH
SOL 67-56-1 MeOH, 7732-18-5 Water

STAGE(2)
RGT U 7647-01-0 HCl
SOL 141-78-6 AcOEt
PRO AQ 398453-69-5
NTE sapon. under reflux for 1 h; acidification with concd. HCl

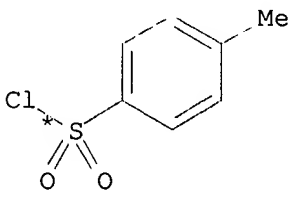
RX(19) RCT AQ 398453-69-5
RGT J 98-59-9 TsCl
PRO AT **398453-73-1**
SOL 29611-84-5 Collidine
NTE decarboxylation and dehydration (olefination) at 170.degree. for 2 h

RX(393) OF 398 COMPOSED OF RX(3), RX(2), RX(5), RX(7), RX(10), RX(11), RX(13), RX(15), RX(34), RX(22), RX(26)
RX(393) 5 **G** + 4 J + 4 O + 4 V + 4 AD + 2 BG ===>

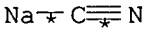
BE



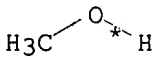
5 G



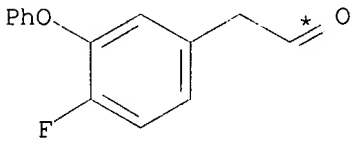
4 J



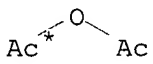
4 O



4 V

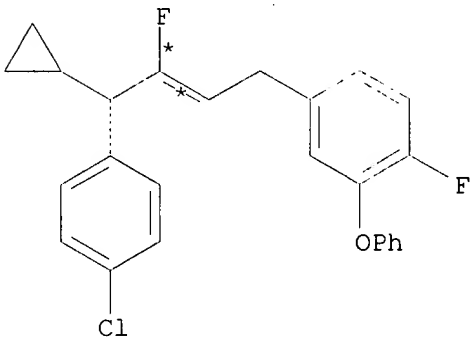


4 AD



2 BG

11 STEPS



BE
YIELD 69%

RX(3) RCT G **119544-56-8**
PRO A 398453-51-5, E 398453-52-6
CAT 9016-18-6 Carbonic esterase
SOL 7732-18-5 Water
NTE biotransformation; enzymic stereoselective hydrolysis at room temp. and pH 7.1-8.0

RX(2) RCT E 398453-52-6
RGT C 14044-65-6 BH3-THF
PRO F 119544-60-4
SOL 109-99-9 THF
NTE redn. at room temp. for 4 h

RX(5) RCT F 119544-60-4, J 98-59-9
RGT L 121-44-8 Et3N
PRO N 398453-54-8
SOL 75-09-2 CH2Cl2
NTE tosylation at room temp. for 3 days

RX(7) RCT N 398453-54-8, O 143-33-9
PRO R 398453-56-0
SOL 67-68-5 DMSO
NTE cyanation at 90.degree. for 3 h

RX(10) RCT R 398453-56-0

STAGE(1)
RGT T 1310-73-2 NaOH
SOL 7732-18-5 Water, 67-56-1 MeOH

STAGE(2)
RGT U 7647-01-0 HCl
SOL 7732-18-5 Water
PRO X 398453-58-2
NTE alkali hydrolysis under reflux for 18 h; acidification at 0.degree.

RX(11) RCT X 398453-58-2, V 67-56-1
PRO Y 398453-60-6
CAT 7647-01-0 HCl
NTE esterification at room temp. for 18 h

RX(13) RCT Y 398453-60-6

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RGT AB 133745-75-2 (PhSO2)NF
PRO AC 398453-62-8
NTE deprotonation at -78.degree. to 0.degree. over 5 min; fluorination at room temp. for 2 h

RX(15) RCT AC 398453-62-8

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RCT AD 117252-07-0
PRO AI 398464-73-8, AJ 398464-74-9, AK 398464-75-0, AL 398464-76-1
NTE deprotonation at -78.degree. for 15 min; addn. reaction at -78.degree. for 2 h; 50% overall yield

RX(34) RCT AI 398464-73-8, AL 398464-76-1, BG 108-24-7
PRO AP 398453-64-0, AW 398453-77-5
CAT 1122-58-3 4-DMAP
SOL 75-09-2 CH2Cl2
NTE acetylation at room temp. for 2 h

RX(22) RCT AW 398453-77-5

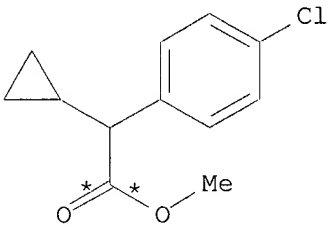
STAGE(1)
RGT T 1310-73-2 NaOH
SOL 67-56-1 MeOH, 7732-18-5 Water

STAGE(2)
RGT U 7647-01-0 HCl
SOL 141-78-6 AcOEt

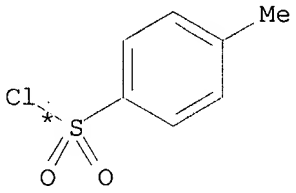
PRO AX 398453-81-1
NTE sapon. under reflux for 1 h; acidification with concd. HCl

RX(26) RCT AX 398453-81-1
RGT J 98-59-9 TsCl
PRO BE **398453-72-0**
SOL 29611-84-5 Collidine
NTE decarboxylation and dehydration (olefination) at 170.degree. for 2 h

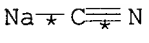
RX(394) OF 398 COMPOSED OF RX(3), RX(2), RX(5), RX(7), RX(10), RX(11), RX(13), RX(15), RX(36), RX(22), RX(26)
RX(394) 5 **G** + 4 J + 4 O + 4 V + 4 AD + 2 BG ===>
BE



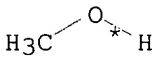
5 G



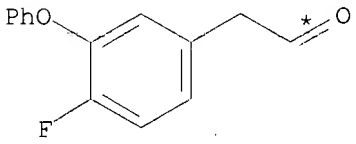
4 J



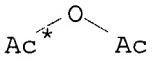
4 O



4 V

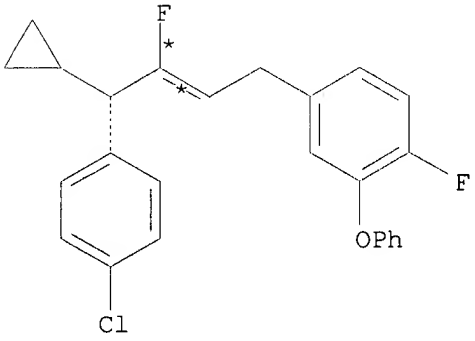


4 AD



2 BG

11 STEPS



BE
YIELD 69%

RX(3) RCT G **119544-56-8**
PRO A 398453-51-5, E 398453-52-6
CAT 9016-18-6 Carbonic esterase
SOL 7732-18-5 Water

NTE biotransformation; enzymic stereoselective hydrolysis at room temp. and pH 7.1-8.0

RX(2) RCT E 398453-52-6
RGT C 14044-65-6 BH3-THF
PRO F 119544-60-4
SOL 109-99-9 THF
NTE redn. at room temp. for 4 h

RX(5) RCT F 119544-60-4, J 98-59-9
RGT L 121-44-8 Et3N
PRO N 398453-54-8
SOL 75-09-2 CH2Cl2
NTE tosylation at room temp. for 3 days

RX(7) RCT N 398453-54-8, O 143-33-9
PRO R 398453-56-0
SOL 67-68-5 DMSO
NTE cyanation at 90.degree. for 3 h

RX(10) RCT R 398453-56-0

STAGE(1)
RGT T 1310-73-2 NaOH
SOL 7732-18-5 Water, 67-56-1 MeOH

STAGE(2)
RGT U 7647-01-0 HCl
SOL 7732-18-5 Water
PRO X 398453-58-2
NTE alkali hydrolysis under reflux for 18 h; acidification at 0.degree.

RX(11) RCT X 398453-58-2, V 67-56-1
PRO Y 398453-60-6
CAT 7647-01-0 HCl
NTE esterification at room temp. for 18 h

RX(13) RCT Y 398453-60-6

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RGT AB 133745-75-2 (PhSO2)NF
PRO AC 398453-62-8
NTE deprotonation at -78.degree. to 0.degree. over 5 min; fluorination at room temp. for 2 h

RX(15) RCT AC 398453-62-8

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RCT AD 117252-07-0
PRO AI 398464-73-8, AJ 398464-74-9, AK 398464-75-0, AL 398464-76-1
NTE deprotonation at -78.degree. for 15 min; addn. reaction at -78.degree. for 2 h; 50% overall yield

RX(36) RCT AJ 398464-74-9, AL 398464-76-1, BG 108-24-7

PRO AM 398453-63-9, AW 398453-77-5
CAT 1122-58-3 4-DMAP
SOL 75-09-2 CH2Cl2
NTE acetylation at room temp. for 2 h in 79% overall yield

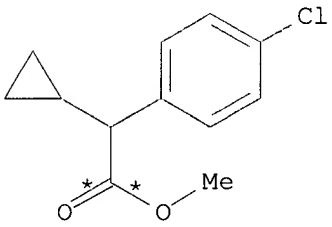
RX(22) RCT AW 398453-77-5

STAGE(1)
RGT T 1310-73-2 NaOH
SOL 67-56-1 MeOH, 7732-18-5 Water

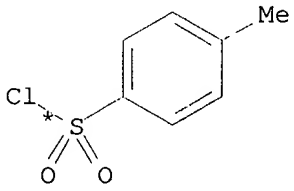
STAGE(2)
RGT U 7647-01-0 HCl
SOL 141-78-6 AcOEt
PRO AX 398453-81-1
NTE sapon. under reflux for 1 h; acidification with concd. HCl

RX(26) RCT AX 398453-81-1
RGT J 98-59-9 TsCl
PRO BE **398453-72-0**
SOL 29611-84-5 Collidine
NTE decarboxylation and dehydration (olefination) at 170.degree. for 2 h

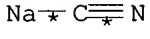
RX(395) OF 398 COMPOSED OF RX(3), RX(2), RX(5), RX(7), RX(10), RX(11), RX(13), RX(15), RX(35), RX(23), RX(27)
RX(395) 5 **G** + 4 J + 4 O + 4 V + 4 AD + 2 BG ===>
BE



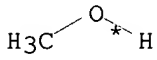
5 G



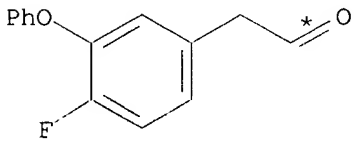
4 J



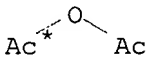
4 O



4 V

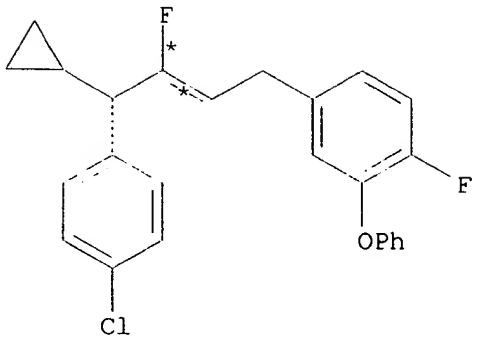


4 AD



2 BG

11 STEPS →



BE
YIELD 69%

RX(3) RCT G **119544-56-8**
PRO A 398453-51-5, E 398453-52-6
CAT 9016-18-6 Carbonic esterase
SOL 7732-18-5 Water
NTE biotransformation; enzymic stereoselective hydrolysis at room temp. and pH 7.1-8.0

RX(2) RCT E 398453-52-6
RGT C 14044-65-6 BH3-THF
PRO F 119544-60-4
SOL 109-99-9 THF
NTE redn. at room temp. for 4 h

RX(5) RCT F 119544-60-4, J 98-59-9
RGT L 121-44-8 Et3N
PRO N 398453-54-8
SOL 75-09-2 CH2Cl2
NTE tosylation at room temp. for 3 days

RX(7) RCT N 398453-54-8, O 143-33-9
PRO R 398453-56-0
SOL 67-68-5 DMSO
NTE cyanation at 90.degree. for 3 h

RX(10) RCT R 398453-56-0

STAGE(1)
RGT T 1310-73-2 NaOH
SOL 7732-18-5 Water, 67-56-1 MeOH

STAGE(2)
RGT U 7647-01-0 HCl
SOL 7732-18-5 Water
PRO X 398453-58-2
NTE alkali hydrolysis under reflux for 18 h; acidification at 0.degree.

RX(11) RCT X 398453-58-2, V 67-56-1
PRO Y 398453-60-6
CAT 7647-01-0 HCl
NTE esterification at room temp. for 18 h

RX(13) RCT Y 398453-60-6

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RGT AB 133745-75-2 (PhSO2)NF
PRO AC 398453-62-8
NTE deprotonation at -78.degree. to 0.degree. over 5 min; fluorination at room temp. for 2 h

RX(15) RCT AC 398453-62-8

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RCT AD 117252-07-0
PRO AI 398464-73-8, AJ 398464-74-9, AK 398464-75-0, AL 398464-76-1
NTE deprotonation at -78.degree. for 15 min; addn. reaction at -78.degree. for 2 h; 50% overall yield

RX(35) RCT AI 398464-73-8, AK 398464-75-0, BG 108-24-7
PRO AP 398453-64-0, AY 398453-78-6
CAT 1122-58-3 4-DMAP
SOL 75-09-2 CH2Cl2
NTE acetylation at room temp. for 2 h

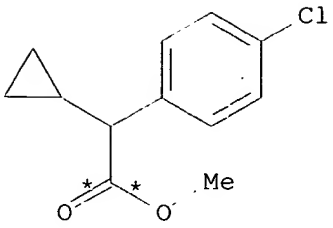
RX(23) RCT AY 398453-78-6

STAGE(1)
RGT T 1310-73-2 NaOH
SOL 67-56-1 MeOH, 7732-18-5 Water

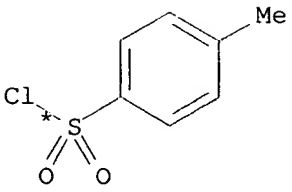
STAGE(2)
RGT U 7647-01-0 HCl
SOL 141-78-6 AcOEt
PRO AZ 398453-82-2
NTE sapon. under reflux for 1 h; acidification with concd. HCl

RX(27) RCT AZ 398453-82-2
RGT J 98-59-9 TsCl
PRO BE **398453-72-0**
SOL 29611-84-5 Collidine
NTE decarboxylation and dehydration (olefination) at 170.degree. for 2 h

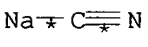
RX(396) OF 398 COMPOSED OF RX(3), RX(2), RX(5), RX(7), RX(10), RX(11), RX(13), RX(15), RX(37), RX(23), RX(27)
RX(396) 5 **G** + 4 J + 4 O + 4 V + 4 AD + 2 BG ===>
BE



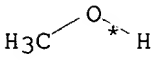
5 G



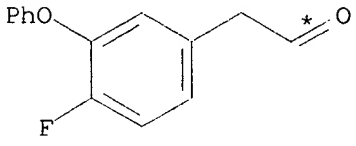
4 J



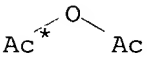
4 O



4 V

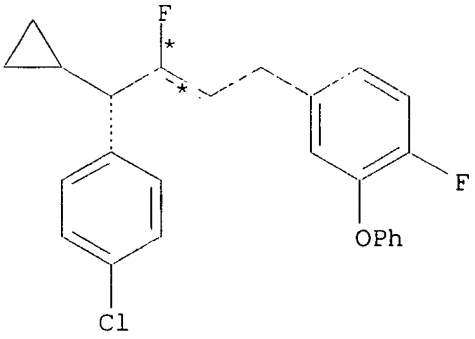


4 AD



2 BG

11 STEPS



BE
YIELD 69%

RX(3) RCT G **119544-56-8**
PRO A 398453-51-5, E 398453-52-6
CAT 9016-18-6 Carbonic esterase
SOL 7732-18-5 Water
NTE biotransformation; enzymic stereoselective hydrolysis at room temp. and pH 7.1-8.0

RX(2) RCT E 398453-52-6
RGT C 14044-65-6 BH3-THF
PRO F 119544-60-4
SOL 109-99-9 THF
NTE redn. at room temp. for 4 h

RX(5) RCT F 119544-60-4, J 98-59-9
RGT L 121-44-8 Et3N
PRO N 398453-54-8
SOL 75-09-2 CH2Cl2
NTE tosylation at room temp. for 3 days

RX(7) RCT N 398453-54-8, O 143-33-9
PRO R 398453-56-0
SOL 67-68-5 DMSO
NTE cyanation at 90.degree. for 3 h

RX(10) RCT R 398453-56-0

STAGE(1)
RGT T 1310-73-2 NaOH
SOL 7732-18-5 Water, 67-56-1 MeOH

STAGE(2)
RGT U 7647-01-0 HCl
SOL 7732-18-5 Water
PRO X 398453-58-2
NTE alkali hydrolysis under reflux for 18 h; acidification at 0.degree.

RX(11) RCT X 398453-58-2, V 67-56-1
PRO Y 398453-60-6
CAT 7647-01-0 HCl
NTE esterification at room temp. for 18 h

RX(13) RCT Y 398453-60-6

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RGT AB 133745-75-2 (PhSO2)NF
PRO AC 398453-62-8
NTE deprotonation at -78.degree. to 0.degree. over 5 min; fluorination at room temp. for 2 h

RX(15) RCT AC 398453-62-8

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RCT AD 117252-07-0
PRO AI 398464-73-8, AJ 398464-74-9, AK 398464-75-0, AL 398464-76-1
NTE deprotonation at -78.degree. for 15 min; addn. reaction at -78.degree. for 2 h; 50% overall yield

RX(37) RCT AK 398464-75-0, AJ 398464-74-9, BG 108-24-7
PRO AM 398453-63-9, AY 398453-78-6
CAT 1122-58-3 4-DMAP
SOL 75-09-2 CH2Cl2
NTE acetylation at room temp. for 2 h

RX(23) RCT AY 398453-78-6

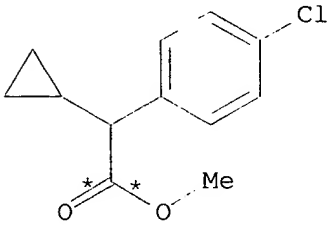
STAGE(1)
RGT T 1310-73-2 NaOH
SOL 67-56-1 MeOH, 7732-18-5 Water

STAGE(2)
RGT U 7647-01-0 HCl
SOL 141-78-6 AcOEt
PRO AZ 398453-82-2

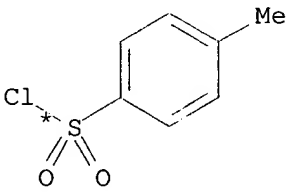
NTE sapon. under reflux for 1 h; acidification with concd. HCl

RX(27) RCT AZ 398453-82-2
RGT J 98-59-9 TsCl
PRO BE **398453-72-0**
SOL 29611-84-5 Collidine
NTE decarboxylation and dehydration (olefination) at 170.degree. for 2 h

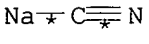
RX(397) OF 398 COMPOSED OF RX(3), RX(2), RX(5), RX(7), RX(10), RX(11), RX(13), RX(15), RX(36), RX(16), RX(20)
RX(397) 5 **G** + 4 J + 4 O + 4 V + 4 AD + 2 BG ===>
AT



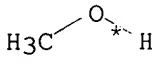
5 G



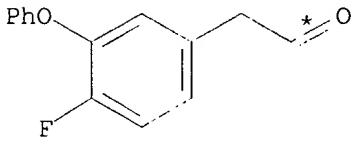
4 J



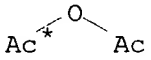
4 O



4 V

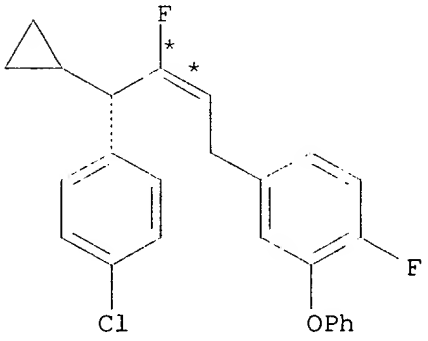


4 AD



2 BG

11 STEPS →



AT

RX(3) RCT G **119544-56-8**
PRO A 398453-51-5, E 398453-52-6
CAT 9016-18-6 Carbonic esterase
SOL 7732-18-5 Water
NTE biotransformation; enzymic stereoselective hydrolysis at room temp. and pH 7.1-8.0

RX(2) RCT E 398453-52-6
RGT C 14044-65-6 BH3-THF
PRO F 119544-60-4
SOL 109-99-9 THF
NTE redn. at room temp. for 4 h

RX(5) RCT F 119544-60-4, J 98-59-9
RGT L 121-44-8 Et3N
PRO N 398453-54-8
SOL 75-09-2 CH2Cl2
NTE tosylation at room temp. for 3 days

RX(7) RCT N 398453-54-8, O 143-33-9
PRO R 398453-56-0
SOL 67-68-5 DMSO
NTE cyanation at 90.degree. for 3 h

RX(10) RCT R 398453-56-0

STAGE(1)
RGT T 1310-73-2 NaOH
SOL 7732-18-5 Water, 67-56-1 MeOH

STAGE(2)
RGT U 7647-01-0 HCl
SOL 7732-18-5 Water
PRO X 398453-58-2
NTE alkali hydrolysis under reflux for 18 h; acidification at 0.degree.

RX(11) RCT X 398453-58-2, V 67-56-1
PRO Y 398453-60-6
CAT 7647-01-0 HCl
NTE esterification at room temp. for 18 h

RX(13) RCT Y 398453-60-6

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RGT AB 133745-75-2 (PhSO2)NF
PRO AC 398453-62-8
NTE deprotonation at -78.degree. to 0.degree. over 5 min; fluorination at room temp. for 2 h

RX(15) RCT AC 398453-62-8

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RCT AD 117252-07-0
PRO AI 398464-73-8, AJ 398464-74-9, AK 398464-75-0, AL 398464-76-1
NTE deprotonation at -78.degree. for 15 min; addn. reaction at -78.degree. for 2 h; 50% overall yield

RX(36) RCT AJ 398464-74-9, AL 398464-76-1, BG 108-24-7
PRO AM 398453-63-9, AW 398453-77-5
CAT 1122-58-3 4-DMAP

SOL 75-09-2 CH2Cl2
NTE acetylation at room temp. for 2 h in 79% overall yield

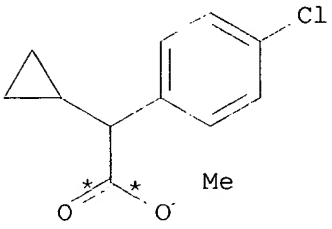
RX(16) RCT AM 398453-63-9

STAGE(1)
RGT T 1310-73-2 NaOH
SOL 67-56-1 MeOH, 7732-18-5 Water

STAGE(2)
RGT U 7647-01-0 HCl
SOL 141-78-6 AcOEt
PRO AN 398453-70-8
NTE sapon. under reflux for 1 h; acidification with concd. HCl

RX(20) RCT AN 398453-70-8
RGT J 98-59-9 TsCl
PRO AT **398453-73-1**
SOL 29611-84-5 Collidine
NTE decarboxylation and dehydration (olefination) at 170.degree. for 2 h

RX(398) OF 398 COMPOSED OF RX(3), RX(2), RX(5), RX(7), RX(10), RX(11), RX(13), RX(15), RX(37), RX(16), RX(20)
RX(398) 5 **G** + 4 J + 4 O + 4 V + 4 AD + 2 BG ===>
AT



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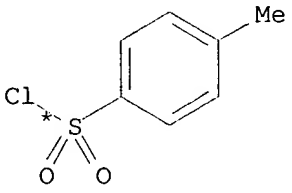

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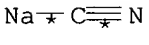

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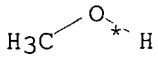

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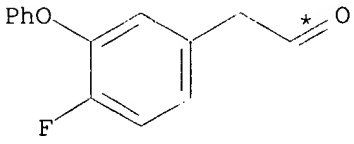

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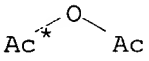
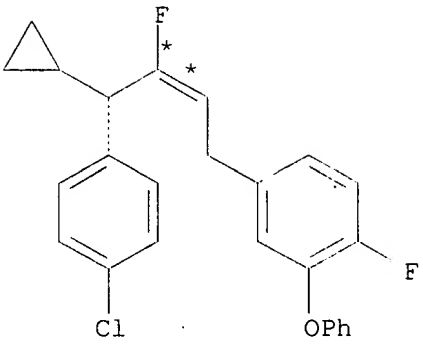


2 BG

11
STEPS



AT

RX(3) RCT G **119544-56-8**
PRO A 398453-51-5, E 398453-52-6
CAT 9016-18-6 Carbonic esterase
SOL 7732-18-5 Water
NTE biotransformation; enzymic stereoselective hydrolysis at room temp. and pH 7.1-8.0

RX(2) RCT E 398453-52-6
RGT C 14044-65-6 BH3-THF
PRO F 119544-60-4
SOL 109-99-9 THF
NTE redn. at room temp. for 4 h

RX(5) RCT F 119544-60-4, J 98-59-9
RGT L 121-44-8 Et3N
PRO N 398453-54-8
SOL 75-09-2 CH2Cl2
NTE tosylation at room temp. for 3 days

RX(7) RCT N 398453-54-8, O 143-33-9
PRO R 398453-56-0
SOL 67-68-5 DMSO
NTE cyanation at 90.degree. for 3 h

RX(10) RCT R 398453-56-0

STAGE(1)
RGT T 1310-73-2 NaOH
SOL 7732-18-5 Water, 67-56-1 MeOH

STAGE(2)
RGT U 7647-01-0 HCl
SOL 7732-18-5 Water
PRO X 398453-58-2
NTE alkali hydrolysis under reflux for 18 h; acidification at 0.degree.

RX(11) RCT X 398453-58-2, V 67-56-1
PRO Y 398453-60-6
CAT 7647-01-0 HCl
NTE esterification at room temp. for 18 h

RX(13) RCT Y 398453-60-6

STAGE(1)

RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RGT AB 133745-75-2 (PhSO2)NF
PRO AC 398453-62-8
NTE deprotonation at -78.degree. to 0.degree. over 5 min; fluorination at room temp. for 2 h

RX(15) RCT AC 398453-62-8

STAGE(1)
RGT AA 4111-54-0 LiN(Pr-i)2
SOL 109-99-9 THF

STAGE(2)
RCT AD 117252-07-0
PRO AI 398464-73-8, AJ 398464-74-9, AK 398464-75-0, AL 398464-76-1
NTE deprotonation at -78.degree. for 15 min; addn. reaction at -78.degree. for 2 h; 50% overall yield

RX(37) RCT AK 398464-75-0, AJ 398464-74-9, BG 108-24-7
PRO AM 398453-63-9, AY 398453-78-6
CAT 1122-58-3 4-DMAP
SOL 75-09-2 CH2Cl2
NTE acetylation at room temp. for 2 h

RX(16) RCT AM 398453-63-9

STAGE(1)
RGT T 1310-73-2 NaOH
SOL 67-56-1 MeOH, 7732-18-5 Water

STAGE(2)
RGT U 7647-01-0 HCl
SOL 141-78-6 AcOEt
PRO AN 398453-70-8
NTE sapon. under reflux for 1 h; acidification with concd. HCl

RX(20) RCT AN 398453-70-8
RGT J 98-59-9 TsCl
PRO AT **398453-73-1**
SOL 29611-84-5 Collidine
NTE decarboxylation and dehydration (olefination) at 170.degree. for 2 h

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=> fil reg; d stat que l28; fil capl; d que nos l29; fil uspatf; d que nos l30
FILE 'REGISTRY' ENTERED AT 12:00:19 ON 28 JAN 2003
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STRUCTURE FILE UPDATES:   27 JAN 2003  HIGHEST RN 482277-90-7
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TSCA INFORMATION NOW CURRENT THROUGH MAY 20, 2002

  Please note that search-term pricing does apply when
  conducting SmartSELECT searches.

Crossover limits have been increased.  See HELP CROSSOVER for details.

Experimental and calculated property data are now available.  See HELP
PROPERTIES for more information.  See STNote 27, Searching Properties
in the CAS Registry File, for complete details:
http://www.cas.org/ONLINE/STN/STNOTES/stnotes27.pdf
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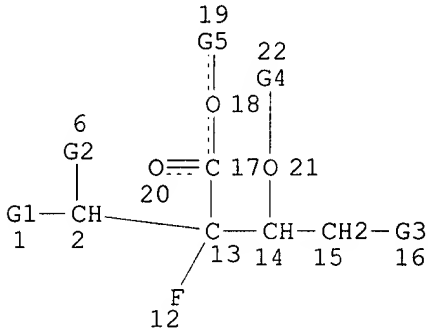
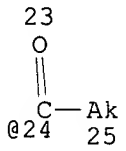
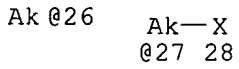
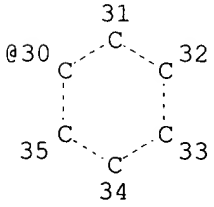
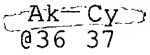
L26 STR











definition for Ar, (G3) expanded as previously noted

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DEFAULT MLEVEL IS ATOM
DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:
RING(S) ARE ISOLATED OR EMBEDDED
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NUMBER OF NODES IS 28

STEREO ATTRIBUTES: NONE
L28 25 SEA FILE=REGISTRY SSS FUL L26

100.0% PROCESSED 1162 ITERATIONS 25 ANSWERS
SEARCH TIME: 00.00.01

FILE 'CAPLUS' ENTERED AT 12:00:19 ON 28 JAN 2003
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FILE COVERS 1907 - 28 Jan 2003 VOL 138 ISS 5
FILE LAST UPDATED: 27 Jan 2003 (20030127/ED)

This file contains CAS Registry Numbers for easy and accurate substance identification.

L26 STR
L28 25 SEA FILE=REGISTRY SSS FUL L26
L29 1 SEA FILE=CAPLUS ABB=ON L28

FILE 'USPATFULL' ENTERED AT 12:00:19 ON 28 JAN 2003

FILE COVERS 1971 TO PATENT PUBLICATION DATE: 28 Jan 2003 (20030128/PD)
FILE LAST UPDATED: 28 Jan 2003 (20030128/ED)
HIGHEST GRANTED PATENT NUMBER: US6513163
HIGHEST APPLICATION PUBLICATION NUMBER: US2003019004
CA INDEXING IS CURRENT THROUGH 28 Jan 2003 (20030128/UPCA)
ISSUE CLASS FIELDS (/INCL) CURRENT THROUGH: 28 Jan 2003 (20030128/PD)
REVISED CLASS FIELDS (/NCL) LAST RELOADED: Dec 2002
USPTO MANUAL OF CLASSIFICATIONS THESAURUS ISSUE DATE: Dec 2002

>>> USPAT2 is now available. USPATFULL contains full text of the <<<
>>> original, i.e., the earliest published granted patents or <<<
>>> applications. USPAT2 contains full text of the latest US <<<
>>> publications, starting in 2001, for the inventions covered in <<<
>>> USPATFULL. A USPATFULL record contains not only the original <<<
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>>>  /PK, etc.                                                          <<<

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>>>  enter this cluster.                                               <<<
>>>                                                                    <<<
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>>>  classifications, or claims, that may potentially change from     <<<
>>>  the earliest to the latest publication.                           <<<

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L26             STR
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L30           1 SEA FILE=USPATFULL ABB=ON  L28


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PROCESSING COMPLETED FOR L29
PROCESSING COMPLETED FOR L30
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=> d ibib abs hitstr 1-2; fil cao; d que nos l31

L32  ANSWER 1 OF 2  CAPLUS  COPYRIGHT 2003 ACS
ACCESSION NUMBER:         2002:122926  CAPLUS
DOCUMENT NUMBER:          136:183615
TITLE:                    Process for the preparation of chiral insecticidal and
                          acaricidal 1,4-diaryl-2-fluoro-2-butenes via enzymic
                          hydrolysis of (4-chlorophenyl)cyclopropylethanoic acid
                          methyl ester using esterase
INVENTOR(S):              Chiarello, John Francis; Buckwalter, Brian Lee;
                          Barden, Timothy Claude
PATENT ASSIGNEE(S):       Basf Aktiengesellschaft, Germany
SOURCE:                   PCT Int. Appl., 75 pp.
                          CODEN: PIXXD2
DOCUMENT TYPE:            Patent
LANGUAGE:                 English
FAMILY ACC. NUM. COUNT:   1
PATENT INFORMATION:

     PATENT NO.        KIND  DATE          APPLICATION NO.  DATE
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     WO 2002012155      A2   20020214      WO 2001-EP9012   20010803
     WO 2002012155      A3   20021128
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US 2002032351 A1 20020314 US 2001-921188 20010802
AU 2001082067 A5 20020218 AU 2001-82067 20010803
PRIORITY APPLN. INFO.: US 2000-222733P P 20000803
WO 2001-EP9012 W 20010803
OTHER SOURCE(S): CASREACT 136:183615; MARPAT 136:183615

AB There is provided a process for the prepn. of a chiral compd. of formula ArC*H(R)CF:CHAr1 [I; Ar, Ar1 = (un)substituted aryl or a 5- or 6-membered heteroarom. ring; R is C1-4 alkyl, C1-4 haloalkyl, C3-6 cycloalkyl or C3-6 halocycloalkyl; Ar1 , is aryl or a 5- or 6-membered heteroarom. ring; C* represents an asym. center] which is useful as an insecticidal and acaricidal agent and for protecting plants from damage caused by insect and acarid attack and infestation (no data). Also provided are intermediate compds. useful in the process of the present invention. This process comprises (a) treating a racemic ester of formula ArCH(R)CO2R4 (II; Ar, R = same as above; R4 = C1-4 alkyl) with an esterase to form a first mixt. of either R-acid of formula ArCH(R)CO2H (III) and S-ester of formula II or of S-acid of formula III and R-ester of formula II, (b) sepg. (R)- or (S)-acid III from said (S)- or (R)-ester II, (c) reducing the chiral acid (R)- or (S)-acid III or (S)- or (R)-ester II to obtain a chiral alc. of formula (R)- or (S)-ArC*H(R)CH2OH, (d) transforming the chiral alc. into an ester (R)- or (S)-ArC*H(R)CH2CO2R1, (e) fluorinating the latter ester to afford a fluoro-ester (R)- or (S)-ArC*H(R)CHFCO2R1, and (f) reacting the latter fluoro-ester with an aldehyde Ar1CH2CHO (Ar1 = same as above) in a solvent in the presence of a base to afford a second mixt. of 4 chiral diastereomeric hydroxy-esters ArC*H(R)CHF(CO2R1)CH(OH)CH2Ar1. It further comprises (g) optionally sepg. the second mixt. into a third mixt. each having two chiral diastereomers, (h) treating the hydroxy-ester mixts. with an acylating agent R2COX1 (R2 = C1-4 alkyl; X1 = Cl, Br, R2CO2) to afford a fifth mixt. of 4 chiral diastereomeric acyloxy esters or a seventh mixt. of two chiral diastereomeric acyloxy esters ArC*H(R)CHF(CO2R1)CH(O2CR2)CH2Ar1, (i) optionally sepg. the sixth or seventh mixt. not essentially pure chiral diastereomeric acyloxy ester, (j) hydrolyzing the pure acyloxy esters or mixts. of esters to afford a hydroxy acid ArC*H(R)CHF(CO2H)CH(OH)CH2Ar1, and (k) heating the hydroxy acid with a arylsulfonyl halide to afford I. Thus, Me (2RS)-(4-chlorophenyl)(cyclopropyl)ethanoate was treated with horse liver esterase in water (pH 7.5) to give 37.9% (2R)-(4-chlorophenyl)(cyclopropyl)ethanoic acid and 36.2% Me (2S)-(4-chlorophenyl)(cyclopropyl)ethanoate, each of which was reduced by BH3.THF/THF at room temp. for 4 h and DIBAL/CH2Cl2 warming from -78.degree. to room temp. and at room temp. for 1 h, resp., to give 84% (2R)-(4-chlorophenyl)(cyclopropyl)ethanol and 80% (2S)-(4-chlorophenyl)(cyclopropyl)ethanol, resp. Each of (2R)- and (2S)-(4-chlorophenyl)(cyclopropyl)ethanol was tosylated by tosyl chloride in the presence of Et3N in CH2Cl2 to (2R)- and (2S)-(4-chlorophenyl)(cyclopropyl)ethyl p-toluenesulfonate, resp., which underwent cyanation with NaCN in DMSO at 90.degree. for 3 h to give (2R)- and (2S)-3-(4-chlorophenyl)-3-cyclopropylpropanenitrile, resp. Alkali hydrolysis of (2R)- and (2S)-3-(4-chlorophenyl)-3-cyclopropylpropanenitrile in a mixt. of 10% aq. NaOH and methanol under reflux for 18 h followed by acidification with concd. HCl gave (2R)- and (2S)-3-(4-chlorophenyl)-3-cyclopropylpropanoic acid, resp., which was esterified with MeOH in the presence of HCl at room temp. for 18 h gave Me (2R)- and (2S)-3-(4-chlorophenyl)-3-cyclopropylpropanoate, resp. Lithiation of the each ester with lithium diisopropylamide (LDA) in THF at -78.degree. to 0.degree. followed by fluorination with (PhSO2)2NF at -78.degree. to room temp. and room temp. for 2 h gave Me (2R)- and (2S)-3-(4-chlorophenyl)-3-cyclopropyl-2-fluoropropanoate, resp. Lithiation of Me (2S)-3-(4-chlorophenyl)-3-cyclopropyl-2-fluoropropanoate with LDA in THF at -78.degree. for 15 min followed by addn. reaction with 4-fluoro-3-phenoxyphenylacetaldehyde at -78.degree. for 2 h gave, after

silica gel chromatog., an oil (A) contg. (2R,3R) and (2R,3S) or (2S,3R)-Me 2-[(S)-(4-chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)-3-hydroxybutanoate and an oil contg. (2S,3S) and (2S,3R) or (2R,3S)-Me 2-[(S)-(4-chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)-3-hydroxybutanoate (steps f and g). Acetylation of the oil A with Ac2O in the presence of DAMP in CH2Cl2 at room temp. for 2 h gave Me (2R,3R)-3-(acetyloxy)-2-[(S)-(4-chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)butanoate and Me (2R,3S or 2S,3R)-3-(acetyloxy)-2-[(S)-(4-chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)butanoate (step h and i). Alkali hydrolysis of the latter diastereomer in a mixt. of 10% aq. NaOH, MeOH, and THF under reflux for 1 h gave (2S,3R or 2R,3S)-2-[(S)-(4-chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)-3-hydroxybutanoic acid (step j) which was heated with tosyl chloride in collidine at 170.degree. for 2 h to give 4-[(2Z,4S)-4-(4-chlorophenyl)-4-cyclopropyl-3-fluoro-2-butenyl]-1-fluoro-2-phenoxybenzene as a colorless oil (step k).

IT **398453-63-9P**, Methyl (2R,3R)-3-(acetyloxy)-2-[(S)-(4-chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)butanoate **398453-64-0P**, Methyl (2S,3S)-3-(acetyloxy)-2-[(S)-(4-chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)butanoate **398453-66-2P**, Methyl (2S,3S)-3-(acetyloxy)-2-[(R)-(4-chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-2-phenoxyphenyl)butanoate **398453-67-3P**, Methyl (2R,3R)-3-(acetyloxy)-2-[(R)-(4-chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)butanoate **398453-68-4P**, Methyl (2S,3S)-3-(acetyloxy)-2-[(R)-(4-chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)butanoate **398453-69-5P**, (2S,3S)-2-[(S)-(4-Chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)-3-hydroxybutanoic acid **398453-70-8P**, (2R,3R)-2-[(S)-(4-Chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)-3-hydroxybutanoic acid **398453-71-9P**, (2R,3R)-2-[(R)-(4-Chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)-3-hydroxybutanoic acid **398453-76-4P** **398453-77-5P**, Methyl (2R,3S)-3-(acetyloxy)-2-[(S)-(4-chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)butanoate **398453-78-6P** **398453-79-7P** **398453-80-0P** **398453-81-1P** **398453-82-2P** **398453-83-3P** **398453-84-4P** **398464-67-0P** **398464-69-2P** **398464-70-5P** **398464-71-6P** **398464-73-8P** **398464-74-9P** **398464-75-0P** **398464-76-1P**

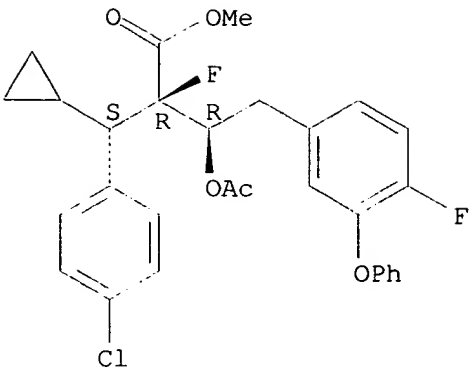
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(intermediate; process for prepn. of chiral insecticidal and acaricidal diarylfluorobutenes via enzymic hydrolysis of (4-chlorophenyl)cyclopropylethanoic acid Me ester using esterase)

RN 398453-63-9 CAPLUS

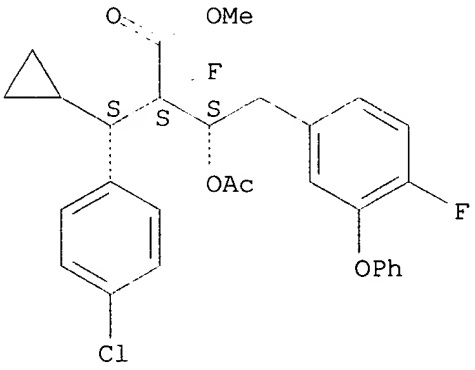
CN Benzenebutanoic acid, .beta.-(acetyloxy)-.alpha.-[(S)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-3-phenoxy-, methyl ester, (.alpha.R,.beta.R)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



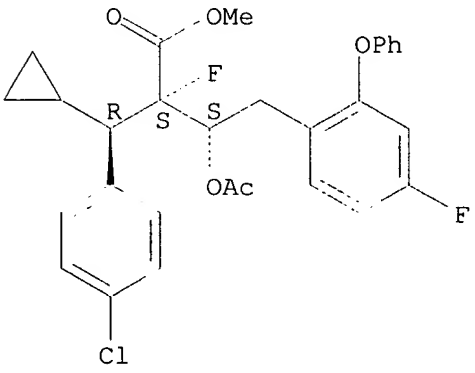
RN 398453-64-0 CAPLUS
CN Benzenebutanoic acid, .beta.-(acetyloxy)-.alpha.-[(S)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-3-phenoxy-, methyl ester, (.alpha.S,.beta.S)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



RN 398453-66-2 CAPLUS
CN Benzenebutanoic acid, .beta.-(acetyloxy)-.alpha.-[(R)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-2-phenoxy-, methyl ester, (.alpha.S,.beta.S)- (9CI) (CA INDEX NAME)

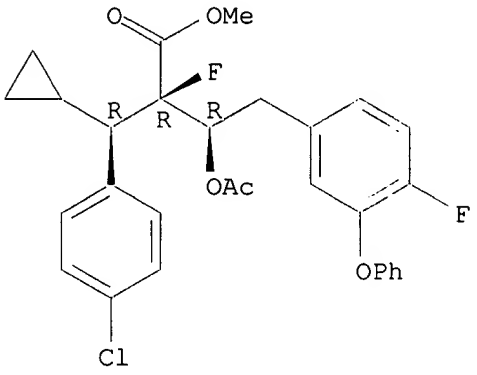
Absolute stereochemistry.



RN 398453-67-3 CAPLUS
CN Benzenebutanoic acid, .beta.-(acetyloxy)-.alpha.-[(R)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-3-phenoxy-, methyl

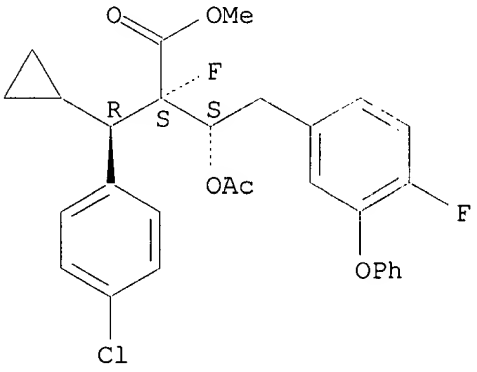
ester, (.alpha.R,.beta.R)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



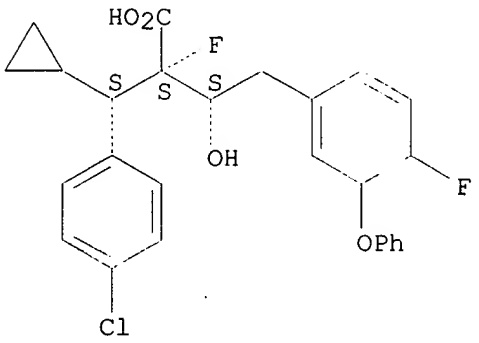
RN 398453-68-4 CAPLUS
CN Benzenebutanoic acid, .beta.-(acetyloxy)-.alpha.-[(R)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-3-phenoxy-, methyl ester, (.alpha.S,.beta.S)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



RN 398453-69-5 CAPLUS
CN Benzenebutanoic acid, .alpha.-[(S)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, (.alpha.S,.beta.S)- (9CI) (CA INDEX NAME)

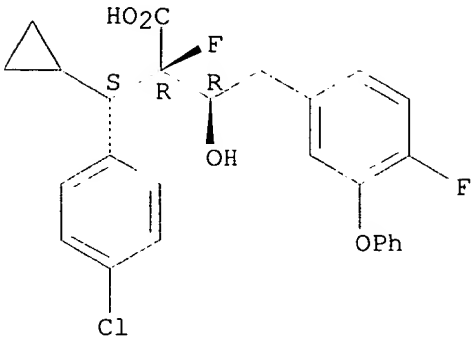
Absolute stereochemistry.



RN 398453-70-8 CAPLUS

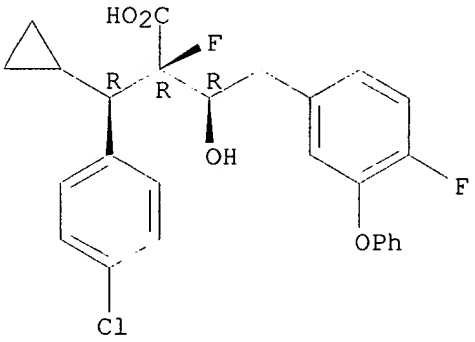
CN Benzenebutanoic acid, .alpha.-[(S)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, (.alpha.R,.beta.R)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



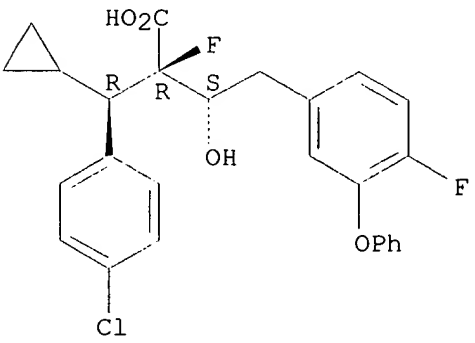
RN 398453-71-9 CAPLUS
CN Benzenebutanoic acid, .alpha.-[(R)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, (.alpha.R,.beta.R)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



RN 398453-76-4 CAPLUS
CN Benzenebutanoic acid, .alpha.-[(R)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, (.alpha.R,.beta.S)- (9CI) (CA INDEX NAME)

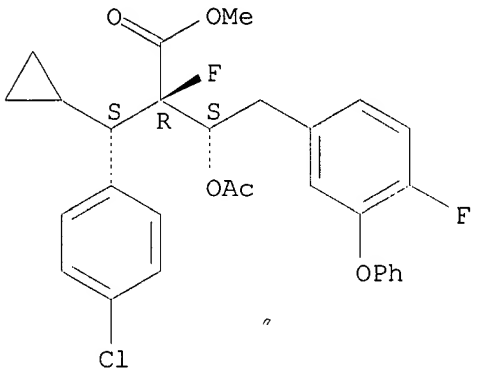
Absolute stereochemistry.



RN 398453-77-5 CAPLUS

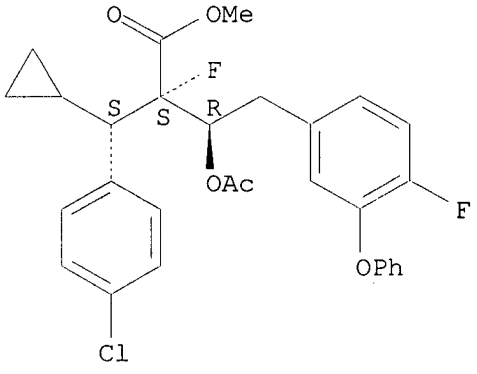
CN Benzenebutanoic acid, .beta.-(acetyloxy)-.alpha.-[(S)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-3-phenoxy-, methyl ester, (.alpha.R,.beta.S)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



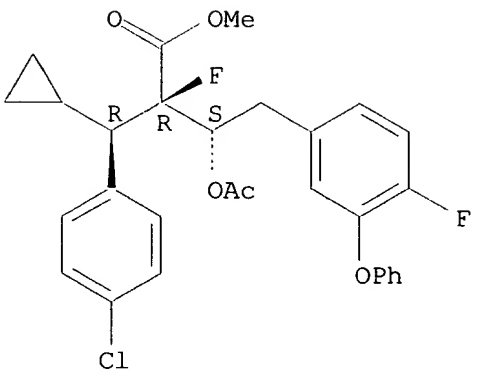
RN 398453-78-6 CAPLUS
CN Benzenebutanoic acid, .beta.-(acetyloxy)-.alpha.-[(S)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-3-phenoxy-, methyl ester, (.alpha.S,.beta.R)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



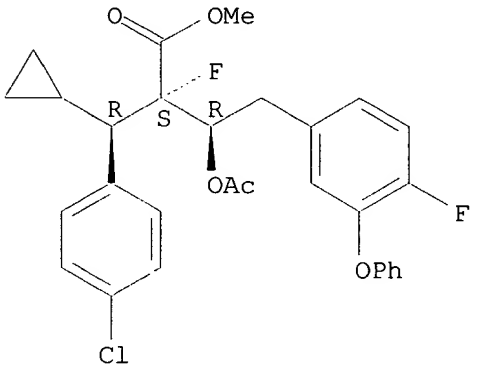
RN 398453-79-7 CAPLUS
CN Benzenebutanoic acid, .beta.-(acetyloxy)-.alpha.-[(R)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-3-phenoxy-, methyl ester, (.alpha.R,.beta.S)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



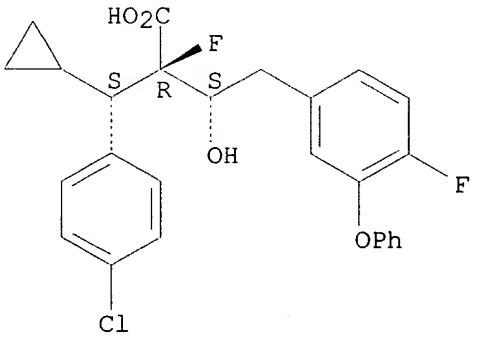
RN 398453-80-0 CAPLUS
CN Benzenebutanoic acid, .beta.-(acetyloxy)-.alpha.-[(R)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-3-phenoxy-, methyl ester, (.alpha.S,.beta.R)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



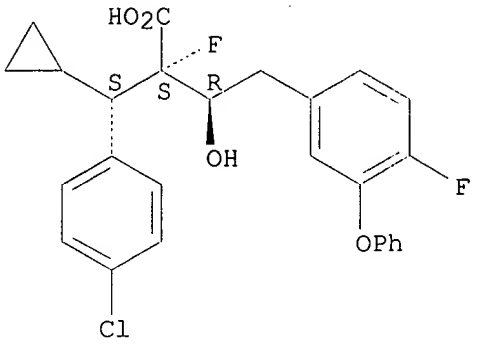
RN 398453-81-1 CAPLUS
CN Benzenebutanoic acid, .alpha.-[(S)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, (.alpha.R,.beta.S)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



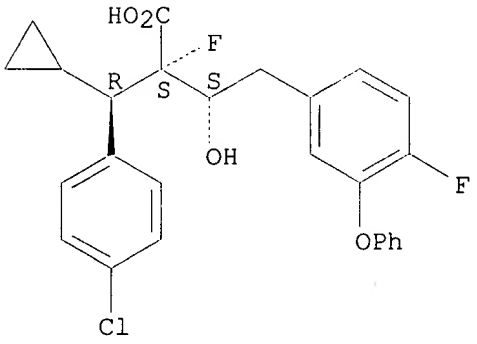
RN 398453-82-2 CAPLUS
CN Benzenebutanoic acid, .alpha.-[(S)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, (.alpha.S,.beta.R)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



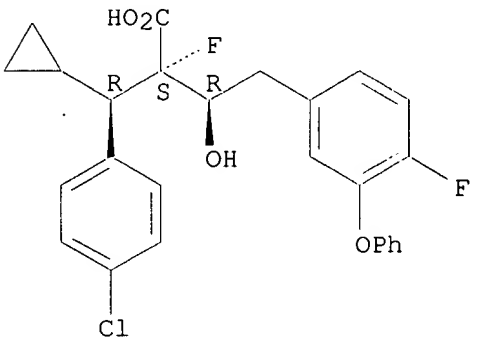
RN 398453-83-3 CAPLUS
CN Benzenebutanoic acid, .alpha.-[(R)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, (.alpha.S,.beta.S)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



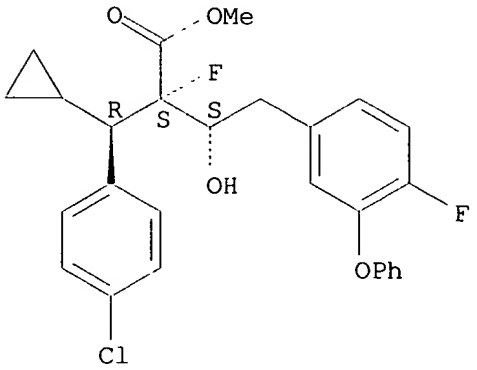
RN 398453-84-4 CAPLUS
CN Benzenebutanoic acid, .alpha.-[(R)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, (.alpha.S,.beta.R)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



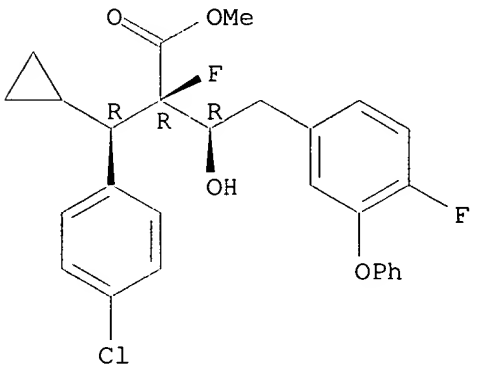
RN 398464-67-0 CAPLUS
CN Benzenebutanoic acid, .alpha.-[(R)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, methyl ester, (.alpha.S,.beta.S)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



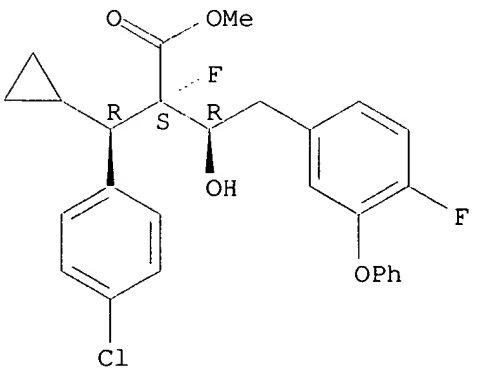
RN 398464-69-2 CAPLUS
CN Benzenebutanoic acid, .alpha.-[(R)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, methyl ester, (.alpha.R,.beta.R)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



RN 398464-70-5 CAPLUS
CN Benzenebutanoic acid, .alpha.-[(R)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, methyl ester, (.alpha.S,.beta.R)- (9CI) (CA INDEX NAME)

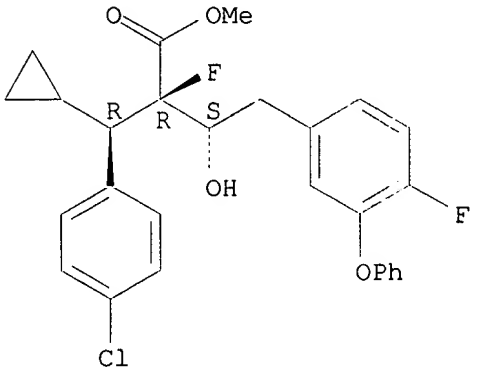
Absolute stereochemistry.



RN 398464-71-6 CAPLUS

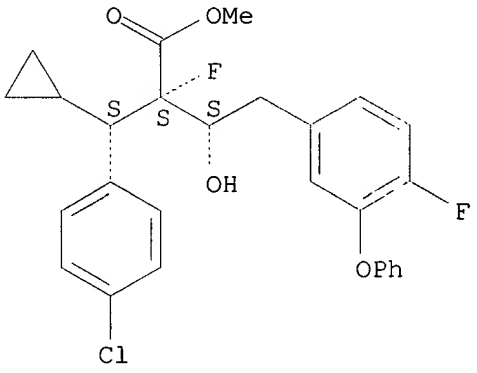
CN Benzenebutanoic acid, .alpha.-[(R)-(4-chlorophenyl)cyclopropylmethyl]-
.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, methyl ester,
(.alpha.R,.beta.S)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



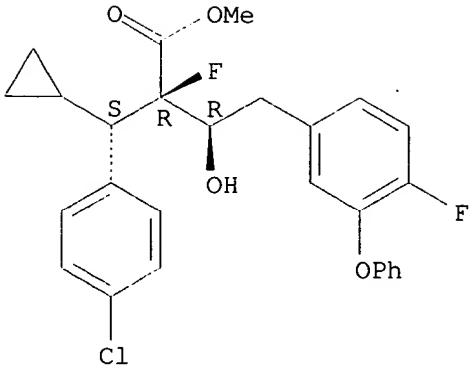
RN 398464-73-8 CAPLUS
CN Benzenebutanoic acid, .alpha.-[(S)-(4-chlorophenyl)cyclopropylmethyl]-
.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, methyl ester,
(.alpha.S,.beta.S)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



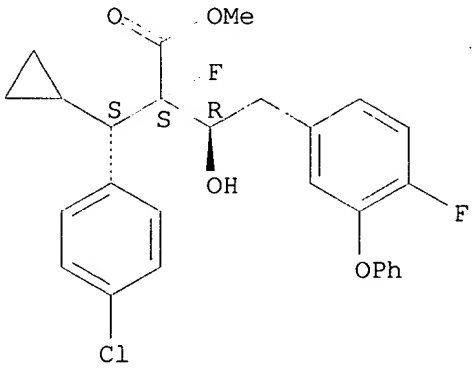
RN 398464-74-9 CAPLUS
CN Benzenebutanoic acid, .alpha.-[(S)-(4-chlorophenyl)cyclopropylmethyl]-
.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, methyl ester,
(.alpha.R,.beta.R)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



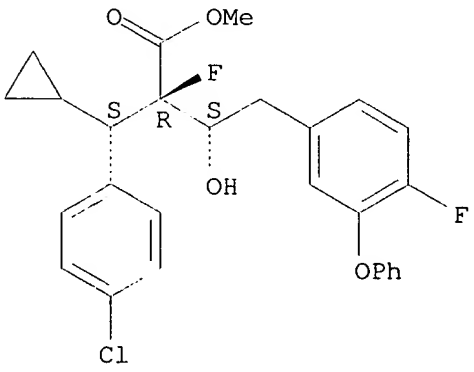
RN 398464-75-0 CAPLUS
CN Benzenebutanoic acid, .alpha.-[(S)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, methyl ester, (.alpha.S,.beta.R)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



RN 398464-76-1 CAPLUS
CN Benzenebutanoic acid, .alpha.-[(S)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, methyl ester, (.alpha.R,.beta.S)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



L32 ANSWER 2 OF 2 USPATFULL
ACCESSION NUMBER: 2002:55187 USPATFULL

TITLE: Process for the preparation of chiral isofluoroenes
INVENTOR(S): Chiarello, John Francis, Newtown, PA, UNITED STATES
Buckwalter, Brian Lee, Yardley, PA, UNITED STATES
Barden, Timothy Claude, Holland, PA, UNITED STATES
PATENT ASSIGNEE(S): BASF Aktiengesellschaft, Ludwigshafen, GERMANY, FEDERAL REPUBLIC OF (U.S. corporation)

	NUMBER	KIND	DATE
PATENT INFORMATION:	US 2002032351	A1	20020314
APPLICATION INFO.:	US 2001-921188	A1	20010802 (9)

	NUMBER	DATE
PRIORITY INFORMATION:	US 2000-222733P	20000803 (60)

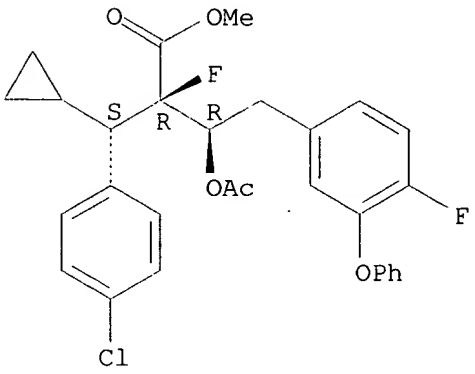
DOCUMENT TYPE: Utility
FILE SEGMENT: APPLICATION
LEGAL REPRESENTATIVE: Susan Shaw, Intellectual Property Department, BASF Corporation, 3000 Continental Drive - North, Mount Olive, NJ, 07828-1234
NUMBER OF CLAIMS: 11
EXEMPLARY CLAIM: 1
LINE COUNT: 1076
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB There is provided a process for the preparation of a chiral insecticidal and acaricidal compound of formula I. ##STR1##

Also provided are intermediate compounds useful in the process of the present invention.

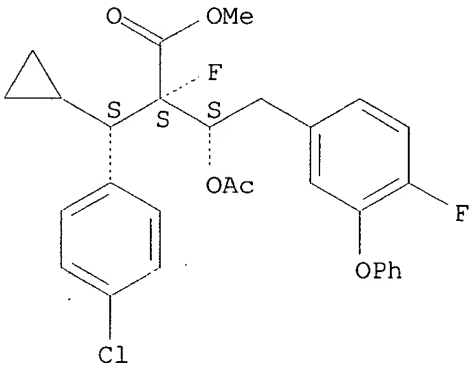
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
IT **398453-63-9P**, Methyl (2R,3R)-3-(acetyloxy)-2-[(S)-(4-chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)butanoate **398453-64-0P**, Methyl (2S,3S)-3-(acetyloxy)-2-[(S)-(4-chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)butanoate **398453-66-2P**, Methyl (2S,3S)-3-(acetyloxy)-2-[(R)-(4-chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-2-phenoxyphenyl)butanoate **398453-67-3P**, Methyl (2R,3R)-3-(acetyloxy)-2-[(R)-(4-chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)butanoate **398453-68-4P**, Methyl (2S,3S)-3-(acetyloxy)-2-[(R)-(4-chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)butanoate **398453-69-5P**, (2S,3S)-2-[(S)-(4-Chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)-3-hydroxybutanoic acid **398453-70-8P**, (2R,3R)-2-[(S)-(4-Chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)-3-hydroxybutanoic acid **398453-71-9P**, (2R,3R)-2-[(R)-(4-Chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)-3-hydroxybutanoic acid **398453-76-4P** **398453-77-5P**, Methyl (2R,3S)-3-(acetyloxy)-2-[(S)-(4-chlorophenyl)(cyclopropyl)methyl]-2-fluoro-4-(4-fluoro-3-phenoxyphenyl)butanoate **398453-78-6P** **398453-79-7P** **398453-80-0P** **398453-81-1P** **398453-82-2P** **398453-83-3P** **398453-84-4P** **398464-67-0P** **398464-69-2P** **398464-70-5P** **398464-71-6P** **398464-73-8P** **398464-74-9P** **398464-75-0P** **398464-76-1P**
(intermediate; process for prepn. of chiral insecticidal and acaricidal diarylfluorobutenes via enzymic hydrolysis of (4-chlorophenyl)cyclopropylethanoic acid Me ester using esterase)
RN 398453-63-9 USPATFULL
CN Benzenebutanoic acid, .beta.-(acetyloxy)-.alpha.-[(S)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-3-phenoxy-, methyl ester, (.alpha.R,.beta.R)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



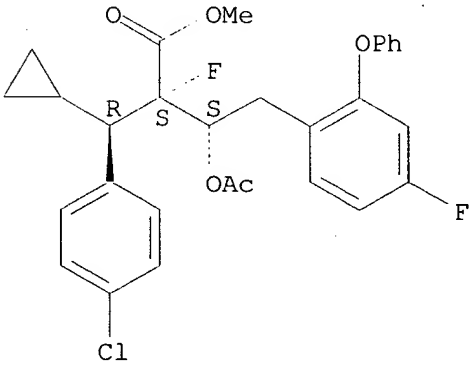
RN 398453-64-0 USPATFULL
CN Benzenebutanoic acid, .beta.-(acetyloxy)-.alpha.-[(S)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-3-phenoxy-, methyl ester, (.alpha.S,.beta.S)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



RN 398453-66-2 USPATFULL
CN Benzenebutanoic acid, .beta.-(acetyloxy)-.alpha.-[(R)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-2-phenoxy-, methyl ester, (.alpha.S,.beta.S)- (9CI) (CA INDEX NAME)

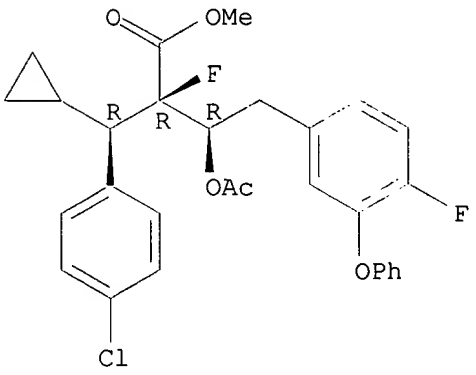
Absolute stereochemistry.



RN 398453-67-3 USPATFULL

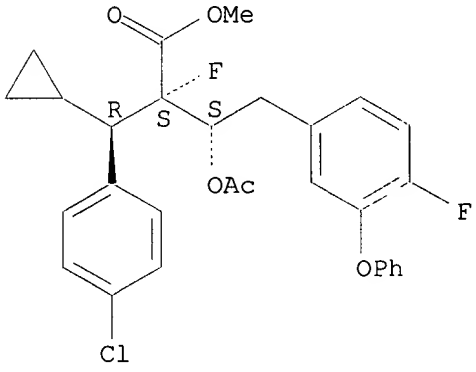
CN Benzenebutanoic acid, .beta.-(acetyloxy)-.alpha.-[(R)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-3-phenoxy-, methyl ester, (.alpha.R,.beta.R)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



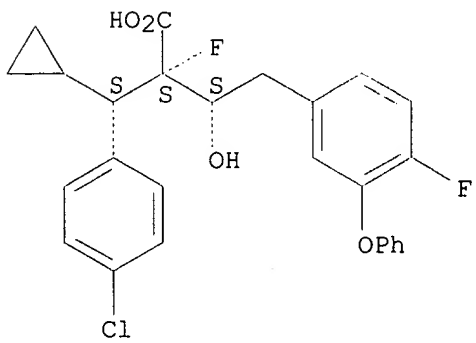
RN 398453-68-4 USPATFULL
CN Benzenebutanoic acid, .beta.-(acetyloxy)-.alpha.-[(R)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-3-phenoxy-, methyl ester, (.alpha.S,.beta.S)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



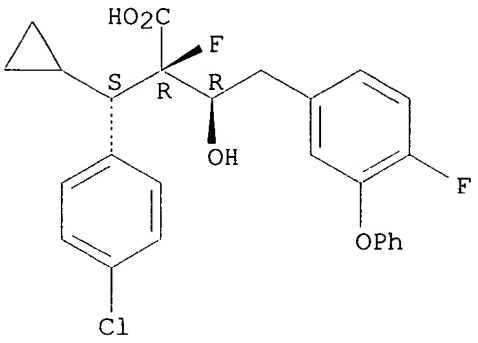
RN 398453-69-5 USPATFULL
CN Benzenebutanoic acid, .alpha.-[(S)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, (.alpha.S,.beta.S)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



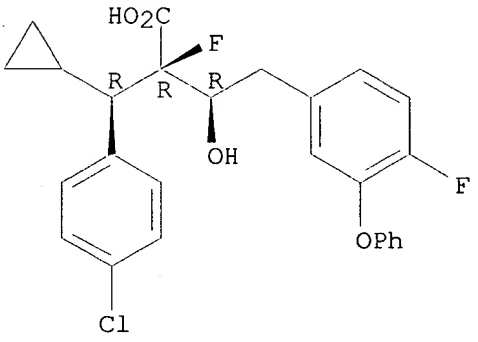
RN 398453-70-8 USPATFULL
CN Benzenebutanoic acid, .alpha.-[(S)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, (.alpha.R,.beta.R)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



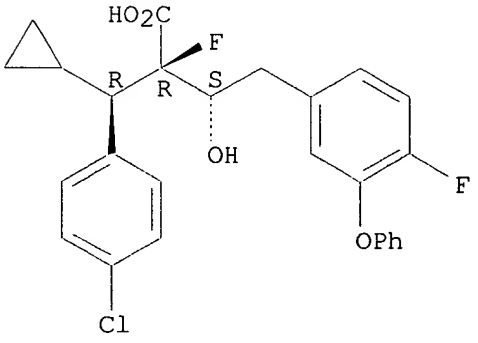
RN 398453-71-9 USPATFULL
CN Benzenebutanoic acid, .alpha.-[(R)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, (.alpha.R,.beta.R)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



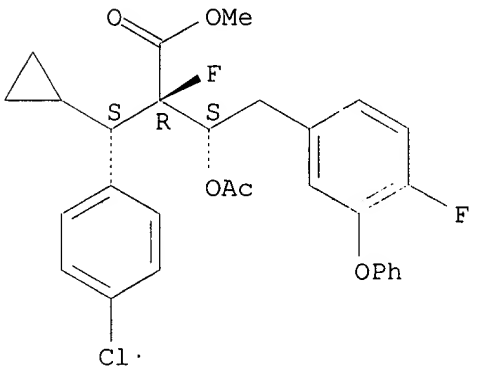
RN 398453-76-4 USPATFULL
CN Benzenebutanoic acid, .alpha.-[(R)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, (.alpha.R,.beta.S)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



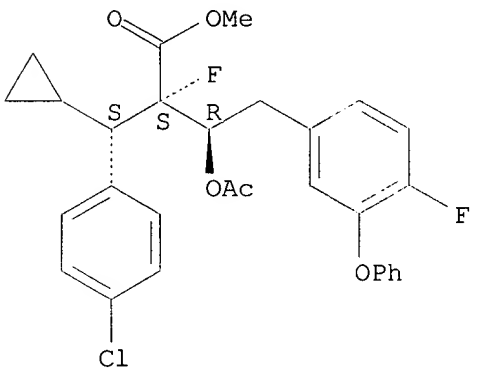
RN 398453-77-5 USPATFULL
CN Benzenebutanoic acid, .beta.-(acetyloxy)-.alpha.-[(S)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-3-phenoxy-, methyl ester, (.alpha.R,.beta.S)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



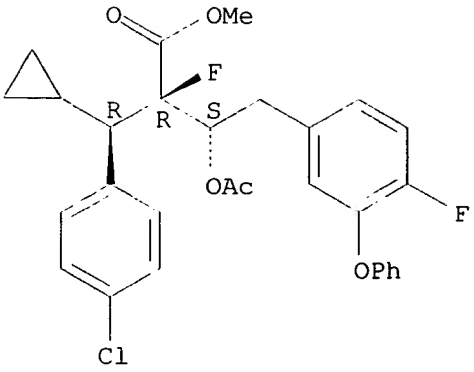
RN 398453-78-6 USPATFULL
CN Benzenebutanoic acid, .beta.-(acetyloxy)-.alpha.-[(S)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-3-phenoxy-, methyl ester, (.alpha.S,.beta.R)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



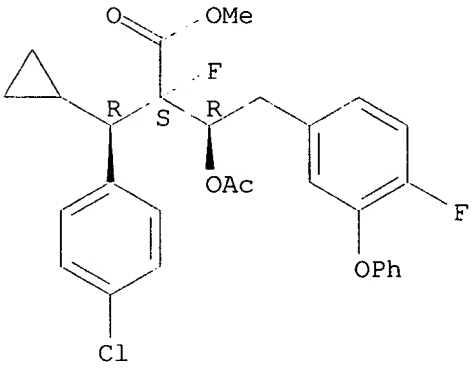
RN 398453-79-7 USPATFULL
CN Benzenebutanoic acid, .beta.-(acetyloxy)-.alpha.-[(R)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-3-phenoxy-, methyl ester, (.alpha.R,.beta.S)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



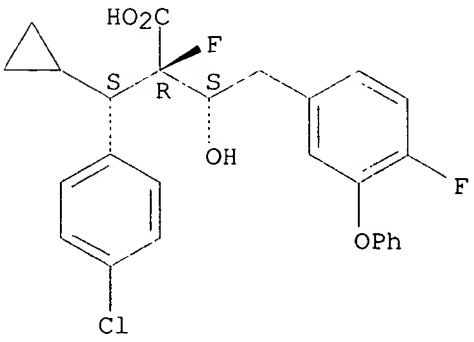
RN 398453-80-0 USPATFULL
CN Benzenebutanoic acid, .beta.-(acetyloxy)-.alpha.-[(R)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-3-phenoxy-, methyl ester, (.alpha.S,.beta.R)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



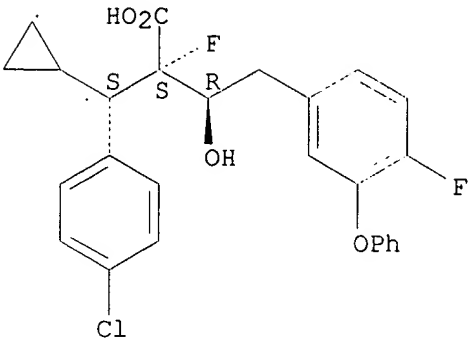
RN 398453-81-1 USPATFULL
CN Benzenebutanoic acid, .alpha.-[(S)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, (.alpha.R,.beta.S)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



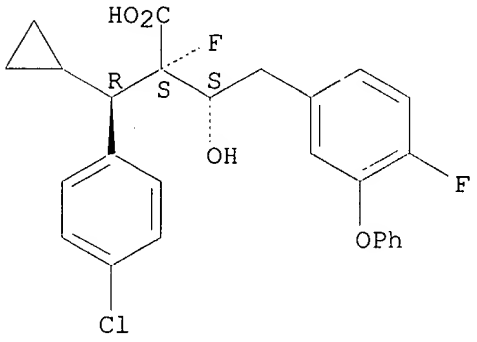
RN 398453-82-2 USPATFULL
CN Benzenebutanoic acid, .alpha.-[(S)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, (.alpha.S,.beta.R)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



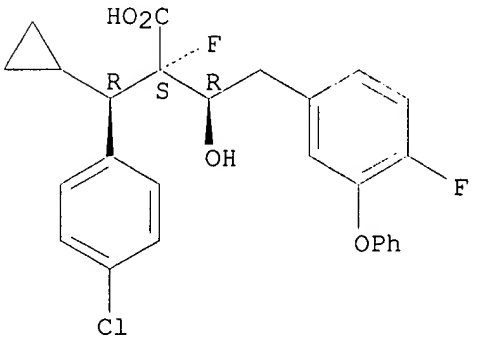
RN 398453-83-3 USPATFULL
CN Benzenebutanoic acid, .alpha.-[(R)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, (.alpha.S,.beta.S)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



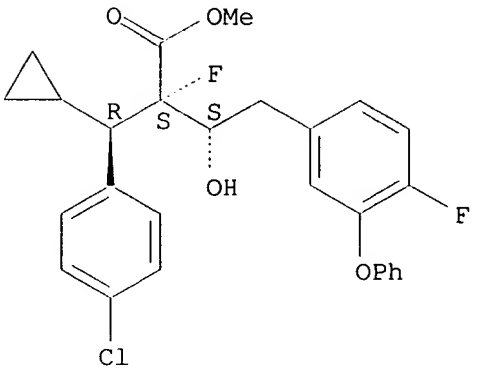
RN 398453-84-4 USPATFULL
CN Benzenebutanoic acid, .alpha.-[(R)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, (.alpha.S,.beta.R)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



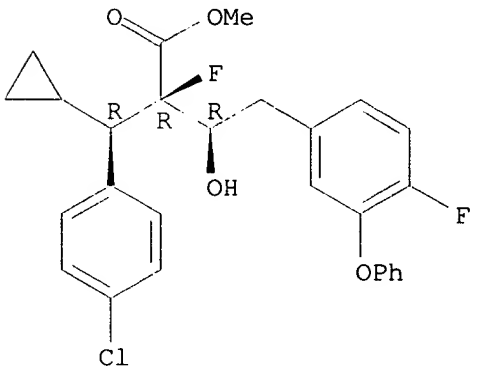
RN 398464-67-0 USPATFULL
CN Benzenebutanoic acid, .alpha.-[(R)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, methyl ester, (.alpha.S,.beta.S)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



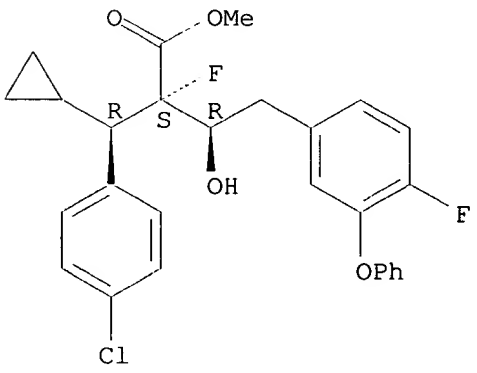
RN 398464-69-2 USPATFULL
CN Benzenebutanoic acid, .alpha.-[(R)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, methyl ester, (.alpha.R,.beta.R)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



RN 398464-70-5 USPATFULL
CN Benzenebutanoic acid, .alpha.-[(R)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, methyl ester, (.alpha.S,.beta.R)- (9CI) (CA INDEX NAME)

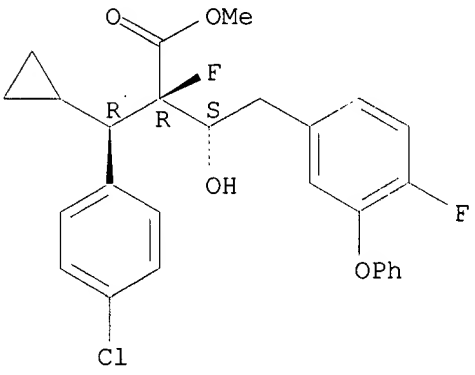
Absolute stereochemistry.



RN 398464-71-6 USPATFULL

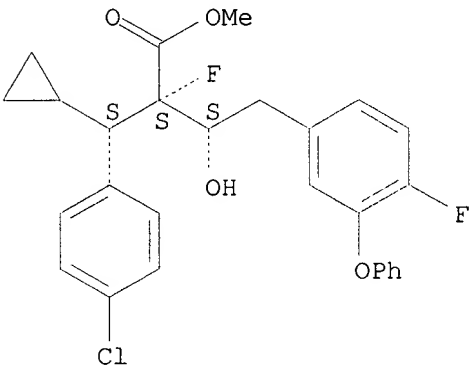
CN Benzenebutanoic acid, .alpha.-[(R)-(4-chlorophenyl)cyclopropylmethyl]-
.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, methyl ester,
(.alpha.R,.beta.S)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



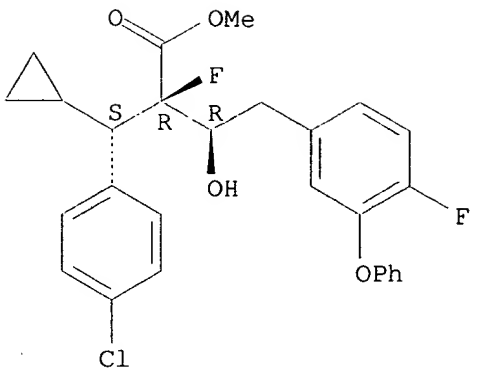
RN 398464-73-8 USPATFULL
CN Benzenebutanoic acid, .alpha.-[(S)-(4-chlorophenyl)cyclopropylmethyl]-
.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, methyl ester,
(.alpha.S,.beta.S)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



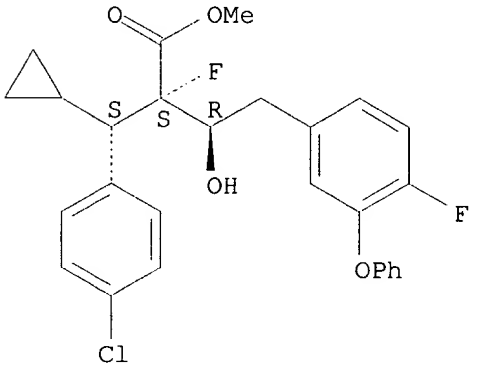
RN 398464-74-9 USPATFULL
CN Benzenebutanoic acid, .alpha.-[(S)-(4-chlorophenyl)cyclopropylmethyl]-
.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, methyl ester,
(.alpha.R,.beta.R)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



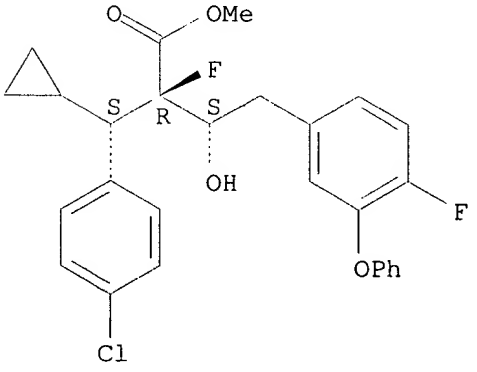
RN 398464-75-0 USPATFULL
CN Benzenebutanoic acid, .alpha.-[(S)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, methyl ester, (.alpha.S,.beta.R)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



RN 398464-76-1 USPATFULL
CN Benzenebutanoic acid, .alpha.-[(S)-(4-chlorophenyl)cyclopropylmethyl]-.alpha.,4-difluoro-.beta.-hydroxy-3-phenoxy-, methyl ester, (.alpha.R,.beta.S)- (9CI) (CA INDEX NAME)

Absolute stereochemistry.



FILE 'CAOLD' ENTERED AT 12:00:39 ON 28 JAN 2003
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FILE COVERS 1907-1966
FILE LAST UPDATED: 01 May 1997 (19970501/UP)

This file contains CAS Registry Numbers for easy and accurate substance identification. Title keywords, authors, patent assignees, and patent information, e.g., patent numbers, are now searchable from 1907-1966. TIFF images of CA abstracts printed between 1907-1966 are available in the PAGE display formats.

This file supports REG1stRY for direct browsing and searching of all substance data from the REGISTRY file. Enter HELP FIRST for more information.

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L28 25 SEA FILE=REGISTRY SSS FUL L26
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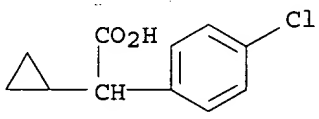
FILE 'HOME' ENTERED AT 12:06:52 ON 28 JAN 2003

03225

L6 ANSWER 166 OF 172 CAPLUS COPYRIGHT 2002 ACS
AN 1970:12378 CAPLUS
DN 72:12378
TI .alpha.-Phenylcycloaliphatic acids and amides
IN Dickel, Daniel F.; De Stevens, George
PA CIBA Ltd.
SO Ger. Offen., 51 pp.
CODEN: GWXXBX
DT Patent
LA German
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 1913531	A	19691009	DE 1969-1913531	19690318
	NL 6903270	A	19690930	NL 1969-3270	19690303
	FR 2004826	A1	19691205	FR 1969-8704	19690325
	BE 730523	A	19690926	BE 1969-730523	19690326
	US 3786085	A	19740115	US 1969-858893	19690917
	US 3880916	A	19750429	US 1973-350447	19730412
PRAI	US 1968-716290		19680327		
	US 1969-789076		19690102		
	US 1969-808341		19690318		
	US 1969-858893		19690917		

IT **24438-45-7P**
RL: SPN (Synthetic preparation); PREP (Preparation)
(prepn. of)
RN 24438-45-7 CAPLUS
CN Benzeneacetic acid, 4-chloro-.alpha.-cyclopropyl- (9CI) (CA INDEX NAME)



921188

L6 ANSWER 162 OF 172 CAPLUS COPYRIGHT 2002 ACS
AN 1978:50521 CAPLUS
DN 88:50521
TI Insecticidal cyclopropylphenylacetic acid esters
IN Elliott, Michael; Janes, Norman Frank; Pulman, David Allen
PA National Research Development Corp., UK
SO Ger. Offen., 26 pp.
CODEN: GWXXBX
DT Patent
LA German
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 2717414	A1	19771103	DE 1977-2717414	19770420
	DE 2717414	C2	19871015		
	GB 1580193	A	19801126	GB 1976-16234	19760422
	NL 7704252	A	19771025	NL 1977-4252	19770419
	US 4137324	A	19790130	US 1977-789226	19770420
	JP 52131563	A2	19771104	JP 1977-46689	19770421
	JP 62029422	B4	19870625		
	FR 2348919	A1	19771118	FR 1977-12082	19770421
	FR 2348919	B1	19820716		
PRAI	GB 1976-16234		19760422		

IT **24438-45-7P**
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation)
(prepn. and esterification of)
RN 24438-45-7 CAPLUS
CN Benzeneacetic acid, 4-chloro-.alpha.-cyclopropyl- (9CI) (CA INDEX NAME)